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OUTLINES OF ORGANOTHERAPY

BY

HENRY R. HARROWER, M. D.

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OUTLINES OF ORGANOTHERAPY

OUTLINES OF ORGANOTHERAPY

With an Appendix on PLURIGLANDULAR THERAPY

by

HENRY R. HARROWER, M. D.,

Late Professor of Clinical Diagnosis, Loyola University,
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INTRODUCTION

SINCE the remote days of Hippocrates and Galen, and even the "sponsor of scientific organotherapy," the much-maligned Brown-Sequard, organotherapy has been used and discarded and used again. It is indeed a study of perennial interest and at no time has this subject attained so great and increasing a vogue as in these last few years.

There are three reasons for this that occur to me:

(1) Many experimental and clinical experiences have developed intelligible reasons for previous empirical practices;

(2) The production and standardization of glandular "extracts" (as they still are erroneously called) has attained a degree of excellence which far exceeds the work of previous years;

(3) The results following the use of organotherapeutic preparations sometimes are astonishing, even though other measures calculated to secure benefit have been tried again and again with little or no advantage.

So far as I know there are some 47 books devoted to the internal secretions, the ductless glands, their pathology and other intimately allied subjects. Perhaps half of these are in the English language. Besides these books there are literally thousands of articles and reports on the therapeutics that this increasing knowledge has made possible. The study of *organotherapy* or, as it is occasionally called "hormone therapy," is daily gaining in scope and prestige.

Over two years of study in this field in Europe, with numerous visits to Paris—admitted to be the seat of learning in the science of "opothèrapie"—Berlin, Brussels, Copenhagen, Amsterdam, London and Edinburgh, caused me to have a much greater respect for the subject which did not seem to be in particularly good repute when I left America in 1912. Many conversations with leading investigators in various phases of this subject, stimulated my interest. The literature was studied and a large file of clippings and reprints accumulated. Soon it appeared that much of this information was worth collating and I therefore prepared the manuscript for a book that would introduce interested readers to an extremely broad and fascinating subject which is passing from the stage of academic discussion to that of great value in every-day practice.

"No subject will prove more enthralling to the interested reader than the possibilities of hormone therapy, not only in the obvious disorders of the endocrine glands, but in many other diseases evidently amenable to treatment with their products. Nor will the interest wane when plausible theories have become tangible results; for the possibilities of this method are almost limitless; nor is its chemical basis dependent on the unsupported experiences of a few enthusiastic investigators."

Strangely enough, until the year 1914, there was *no book in English* which thoroughly covered the practical side of this subject, and it was my privilege to publish, just before the European war, a book called "Practical Hormone Therapy, a Manual of Organotherapy for General Practitioners." In this book an attempt was made to collate a majority of the most important facts relating to the many branches of the therapeutics made possible by the advance in our knowledge of the internal secretions and the organs producing them. This information covers such a wide field that the data was divided into 8 sections and 36 chapters. To facilitate the study of this old though still new subject, I added a glossary of terms, many of which are not yet in the medical dictionaries, so rapid has been the recent development of the subject, an organothrapeutic dose-table and a series of bibliographies directing attention to no less than 793 references, the largest proportion of which directly concern the practical side of organotherapy.

The physician who is sufficiently interested to look up some of the bibliographic references to these various subjects, soon will be convinced of the reasonableness of many of the facts and suggestions which have been gathered there, and a much more complete series of references will be opened up to the student, for the bibliographies of the 800 articles indexed in "Practical Hormone Therapy" direct one to at least 4,000 additional communications!

So much for the larger book which, I am glad to say, has been extremely well received and reviewed.

A further notice of it will be found at the end of this book.

The real reason for preparing these "Outlines" is to serve the busy physician who "has no time for reading." There is no doubt that many a difficult case will prove to be amenable to organotherapy, even after several other things have failed. I frequently find myself recalling experiences in my practice of years ago, that I am confident could have been simplified with practically no trouble—had I known what I now know about organotherapy. Ten years ago we did not have corpus luteum or pituitary extract to help us as wonderfully as they sometimes do now.

The following pages comprise in truth the merest outlines. They do not attempt to explain the "why" and the "how." The essential physiologic basis or explanation is missing, as space is not available either for this information or for the numerous clinical experiences and reports which might supplement it, many of which may be found in my other book, or scattered throughout the literature of a dozen countries.

Many of the advantages of organotherapy are as yet little known, and the subject is still so new that there are some physicians who can not be induced to read a 500-page book, who might be interested in a brief "outline" and who later might be more decidedly attracted to a more thorough study of the subject. Such physicians on looking through *this little book* may be prepared for the conclusion that organotherapy contains much more of profitable helpfulness than they at first imagined; hence still another reason for producing this manual will be made clear.

Finally, I believe that there is really a need for just such a book as this. In the conversations which are so often started after reading a paper on some phase of endocrinology, I have been told frequently that the subject was "intensely interesting," but in answer to a question why the physicians were not applying these things, the reply usually was "It takes too much time to dig these things out," or "I've been trying this method for some time now, and am getting splendid results; but I've found so much theory in the literature and have to wade through so much stuff to get the real meat, that it's discouraging." These are actual statements, and I confess to having heard many like them.

So, "OUTLINES OF ORGANOTHERAPY" is intended to offer the "real meat"—the boiled-down essentials of a subject which, according to Leonard Williams, "already unfolds before the astonished view of the seeing eye, a land of promise beside which the discoveries of Lister and Pasteur are destined to pale into honorable insignificance."

Criticisms, comments and suggestions regarding matters which have been omitted or which it seems should be omitted, will be very much appreciated and should be addresesd to me at Glendale, California.

H. R. H.

THE FUNDAMENTALS OF ORGANOTHERAPY

General Principles

The literature on organotherapy, especially that which has been published during the last ten years, is both vast and comprehensive; and marshals unnumbered facts which have placed this most ancient and altogether empiric form of therapeutics upon a scientific and up-to-date basis. The ductless glands have been studied with enthusiasm and thoroughness, and their importance is being more generally recognized because both the physiologists and the pathologists have definitely shown us a part, at least, of their functions and connected their researches with many heretofore unsolved medical puzzles.

The status of the hormones, or the active principles obtained from certain glands of internal secretion secured from animals, and their use as remedial agents, has arrived at a place which reaches well beyond the laboratory of the physiologist. These active principles are undoubtedly specific substances. Some of them already have have been isolated and others are obviously present although they have not yet been chemically separated. These have been given the convenient generic name "hormone" from the Greek, "I arouse," or "set in motion," and are now known to constitute a series of important chemical messengers by means of which *the functions of the* body are correlated.

Each hormone—sometimes an organ has the faculty of producing two or more hormones—has the inherent capacity of exciting to definite activity those cells for which it manifests a special affinity, and we are just beginning to appreciate the considerable importance which attaches to the normal production of these different hormones, as well as to the maintenance of the balance which is brought about by the action and interaction of these variously acting bodies.

While organotherapy is undoubtedly the oldest form of therapeutics, it has become the newest, for the good reason that the discovery of the hormones and their influence upon physiology has enabled the students of the past ten or fifteen years to give a reason for many clinical phenomena and thus establish the empirical procedures of Hippocrates, Galen and others of ancient and more modern times, upon a scientific and unquestioned basis.

Pharmacy has contributed its share to the growth of this phase of therapeutics, and much work has been done, especially in France and America, to produce therapeutically active as well as convenient preparations with which to apply in a practical way, the fundamental principles which have been laid bare.

These fundamental principles have been grouped under four chief heads under which the various organotherapeutic procedures may be classified conveniently. These forms of organotherapy are as follows:

1. Substitutive.
2. Homostimulative.
3. Empirical.
4. Specific.

A very brief consideration of each of these four forms of organotherapy will explain, in part, its scientific basis, and enable the interested reader to classify the animal extracts from a therapeutic standpoint, though in a somewhat different manner from the classification used in this book in which the various organotherapeutic products are arbitrarily divided into three classes according to their present popularity and therapeutic availability.

Substitutive Organotherapy

Properly prepared extracts of various glands supply a deficient physiological secretion of organs that correspond to those from which the extracts are made. The disorder may be due to absence, atrophy or functional inactivity of these organs, i. e., the production of their normal active principles has been reduced or stopped. A typical illustration of this category is the use of thyroid extract to replace the secretion which is missing, as in myxedema.

Homostimulative Organotherapy

The active principles of the internal secretory organs have a definite stimulative and restorative action upon the glands which correspond to those from which the extracts are made. It has been remarked by some French writers that organic extracts exert *a regulative* action upon the organs from which they are derived, not only favoring the restoration of their functions, but also of their normal anatomic structure. Hallion is prominent among these and his "law" briefly states this principle as follows:

"Extracts of an organ exert on the same organ an exciting influence which lasts for a longer or shorter time. When the organ is insufficient, it is conceivable that this influence augments its action, and, when it is injured, that it favors its restoration."

This principle is the basis of a large share of the value of organotherapy, and is represented quite typically by the use of bile in hepato-biliary insufficiency, or ovarian preparations in functional ovarian disorders.

Empirical Organotherapy

Certain animal extracts seem to influence certain clinical manifestations and as a result have come to be used without a definite and acceptable scientific basis. Examples of this form of organotherapy are the pituitary treatment of functional ovarian disorders, or the parathyroid treatment of paralysis agitans.

Incidentally as our appreciation of the intricacies of the endocrine relations grows, the empirical use of organotherapy will disappear and in its place we will put some other form. Already this may be true of the two examples just mentioned.

Specific Organotherapy

Finally it has been found that extracts of certain organs exert a definite physiological influence, not by virtue of a homostimulative action, but by causing certain physiologic activity, or by counteracting some particular morbid symptoms not due to any change in the internal secretory action of the glands of the patient. The most decided and remarkable type of this class of organotherapeutic remedies is the extract of the posterior lobe of the pituitary body and its effect upon the uterine muscle, especially during labor.

Until quite recently it was the exception rather than the rule to find physicians having everyday recourse to the various hormone-bearing products, and while the administration of thyroid, adrenal and pituitary extracts is quite general, it should be remembered that their value was demonstrated before we knew that their activity was really in their contained hormones—before our present more extended knowledge of this subject had been attained.

It seems quite reasonable to presume that if, say, desiccated sheep's thyroids suffice to supply the lack brought about by thyroid insufficiency in the human, and that other glandular extracts serve to produce equally valuable therapeutic results, hormones produced in the glands of animals deserve to be more generally used as remedies; and the administration of the various specific glandular activators should become both a common and important factor in the practice of medicine.

It has been previously remarked that the administration of glandular extracts frequently serves as *an actual stimulus* to the work of the organ corresponding to that from which the extract was made. This may be accomplished by temporarily relieving certain overworked cell collections from the necessity of manufacturing their normal product, and thus allowing them rest, to recuperate and regain their lost or diminished function. Again, this action may be brought about by the specific influence which these hormones are presumed to exert upon the precursors of hormones in corresponding organs—it has been quite thoroughly established that the administration of secretin in addition to bringing about the activation of various digestive zymogens and their liberation from the pancreas, liver and intestine, definitely favors the production of an increased quantity of the precursor of secretin (prosecretin) in the duodenum itself, as well as causing an increase in the blood supply to that particular part. Another equally important field of usefulness for the hormones is to supply immediately to the system substances for which it is craving as, for example, the use of the dynamogenic principles which regulate the so-called "adrenal system" and which are deficient in asthenic, run-down states, or ovarian extract in the disorders which follow the artificial menopause, etc.

If it is possible to procure from animals the substances which serve to activate certain of their functions, and by introducing them into the human body, to accomplish for the patient what these were intended to have done for the animal, is there not a most reasonable philosophy and foundation for the more general application of hormone therapy?

As Leonard Williams, of London, remarked in the preface to his book, "Minor Maladies": "I believe that the serious study of what are called 'minor maladies' will lead to the prevention and forestalling of many serious diseases. Still more earnestly do I believe that the study of the whole field of the internal secretions will enable us to detect and correct morbid tendencies with a degree of success which has been denied to the older methods. The microbe—the seed—has ruled the immediate past; the future is with the soil, the endocrine glands."

It must be remembered that the dosage of products that are active as a result of their hormone content has quite a different basis from that of drugs: There is no definite dosage; save "dose enough." Joseph Pratt of Boston has said: "As all internal secretions are stimulatory substances and do not furnish nutritive material to the cells, they are able to exert their specific action when present in very small quantities."

To one who uses the hormone-bearing extracts for any length of time, and who thus has an opportunity to appreciate their specificity and value, the subject assumes a most important aspect, since it makes possible results otherwise unattainable. In the words of Leonard Williams, this is "a subject of inquiry as fascinating as any in the whole range of medicine, and as fruitful in promise as any in the *whole range* of therapeutics."

Failures with Organotherapy

As with every phase of the treatment of disease we expect to encounter a certain proportion of failures with the administration of organotherapeutic preparations. It could hardly be otherwise, for we have not found the long-sought "Elixir Vitae" which Ponce de Leon and others have vainly looked for.

If we are wise, our failures will become our greatest assets, for through them we may learn more than in any other way. A graduate from the "University of Hard Knocks" always is a better-posted and more dependable man than the one who has secured most of his information easily by avoiding the failures of others, though, naturally, our course in this "university" can be shortened materially by being awake to what others are doing.

In my work I have often heard statements something like this: "I tried that treatment faithfully for several weeks, and it seemed to do no more good than other things we used before. I'm afraid I haven't much use for ...."—corpus luteum, mammary extract, or even thyroid gland have been mentioned. At times organotherapy as a whole has thus been criticised, despite the apparent limitations of the speaker's clinical testing.

This profitably may be used as the text for a short "sermon" which may develop some helpful suggestions for those who are expecting great things from organotherapy, and may still be somewhat new to it.

First of all we must admit that usually organotherapy has been tried in difficult cases of long standing where other measures have been tried and have failed. Here, naturally, the results will be less satisfactory just as any treatment is likely to be less effective the further advanced and more complex is the disease. It is true that organotherapy deserves to be considered in just this class of cases, and it has been remarked many times that when other things have failed, organotherapy has enabled us to get wonderful results, and, perhaps, we have acquired an undue enthusiasm and expect too much of this method. None the less we must not deprecate organotherapy because we can not use it to accomplish the impossible.

There is another very important factor that sometimes seems purposely to be ignored, especially by those who don't want to be convinced! We have seen that the real basis for the benefits to be expected from organotherapy lies in the principle of homostimulation. This means that we must have active preparations and responsive organisms. It is possible to have an inactive remedy, I will admit, though in these days such products far excel those of years ago; but how about the reactivity of the patient and the response of those cell-aggregates it is desired to arouse or set into renewed motion? Especially in chronic disease where the conditions are the results of constant and long-continued irritation, malnutrition or toxemia, the re-education of *the worn-out* endocrine organs is no small task.

And, too, the degree to which the endocrine glands are affected in one case as compared with another semingly quite similar, varies very much indeed. Again, one individual responds to hormone stimuli rapidly and thoroughly, while another does not. One child "catches everything going," while another "has never been sick in her life." It is merely a matter of the physiological substratum—and this indeed is an intangible quantity.

So we continue to use organotherapy expecting a certain percentage of delayed results and even some entire failures, and are more than satisfied with the numerous excellent responses to the natural hormone stimuli that the administration of glandular extracts makes possible.

Another cause of failure is due to stopping before one should. In our "text" above, "several weeks" is the time stated as being the limit of the doctor's patience. Now organotherapy is useful largely because it is a means of educating certain organs to perform their service to the body as a whole. Education is not a matter of days or even weeks. It takes many years to educate the mind. The gastroenterologist knows that it takes months to educate the liver, gastric cells or other organs to perform the task which through various circumstances has been given up or done unsatisfactorily. When we give morphia we expect practically immediate results. It works quick, not by "education" but by paralyzing certain functions. Strychnia also works quick, *not by "education"* but by abnormal stimulation and how long do its effects last?

As a matter of fact the subtle influence of hormone therapy is indeed a re-education of certain organs, and this always takes time and, as we have seen before, depends a great deal upon the responsiveness of the cells. To be successful organotherapy should be added to other treatment, drug, hygienic or dietetic, and should be continued always for a generous time; and further, it should be "tapered off" to see how well the endocrine glands can get along without these additional stimuli.

Still another potent cause of failure is the not unusual tendency to ignore the intimacy of the ductless glands and their most important interrelations. The subject of reinforcing this extract or that is too comprehensive to discuss here (the whole of the Appendix is devoted to a practical study of "Pluriglandular Therapy") and I merely mention as one of the causes of failure, a habit of overlooking associated derangement of other glands which are dependent upon or at least associated with, the particular ductless gland which you may have discovered is at fault and which you are treating with organotherapy. In other words, combining gland extracts is likely to make for better results, and here, let me say with emphasis, is the "open sesame" to the successful application of organotherapy in 99 per cent. of all cases in which this measure is indicated. It is not possible for a single endocrine or*gan to be affected*, slightly or seriously, without reflex (hormonic) effects upon others of the allied organs.

There has been a good deal of comment, especially in some manufacturers' literature, about the organotherapeutic treatment of certain organic diseases, especially of the central nervous system. These statements have led some to expect "cures" in such diseases as locomotor ataxia, multiple sclerosis, paralysis and other generally conceded "incurable" diseases. I do not deny that increased endocrine function is helpful in an organism afflicted with such diseases as those mentioned just as in any others, but it does not replace the destroyed nerve cells, and can not. Organotherapy may be indeed helpful in such hopeless cases, but it is far from curative and it should be obvious that if this method really cured locomotor ataxia, the manufacturers and their fortunate customers would never lack either opportunities to serve or the financial rewards which would naturally come with such a service. Organic disease is not amenable to organotherapy in the degree that we expect functional disease to respond to it—it simply can not be so.

Finally, quite the most important of all the causes of failure with organotherapy (and, for that matter, any other method of treatment) is an incomplete diagnosis. Too often we learn what is the matter with our patient, but not **all** that is wrong. I have repeatedly stated that the medical profession *commits* more sins of omission than of commission. We overlook things. Why, the minor form of hypothyroidism is more than commonly ignored entirely! The consideration of the endocrine side of disease has been passed by until very recently. Disorders of the ductless glands had to be "real diseases" before we recognized them, and hidden functional aberrations were never sought for. Now all is being changed and as our eyes are being opened to the importance of functional pathology not only are we recognizing the early influence of endocrine dysfunction, but we are learning to consider our patient as a whole rather than as an individual with some obvious disease.

Here, then, lies the greatest source of failure in medicine—we have been treating diseases rather than patients! So long as we consider a case of, say, hypothyroidism as being suited for organotherapy and ignore the demineralization (see especially Chapter IV of the Appendix), the acidosis or hypoalkalinity or the original active cause of the disturbance, some hidden focal infection, a dilated and overloaded colon, a dietetic habit (such as coffee-drinking) which has overburdened the detoxicating department of the body or other common underlying causes of disease, we are not going to get the optimal results from our organotherapy.

The reverse is equally true—even if we are most thorough in our diagnosis, and our clinical and laboratory findings are about perfect, we can reduce the efficacy of our treatment quite considerably by *omitting to consid*er the effect that the various derangements may have had upon the endocrine functions and with this information in mind, make a concerted effort to encourage these overworked glands and favor the re-establishment of their normal functional service to the body in conjunction with the other obvious things we need to do.

There are other causes of failure with organotherapy which will occur to the thinking physician and which need not be mentioned here. If you are convinced that a certain procedure is destined to fail, likely as not it will! If the patient is sure your measures are not going to help, the psychic condition may indeed overbalance a large part of the possible benefit. So with organotherapy. We must realize that organotherapy is but a factor in our work and that we can not and must not expect the administration of a few tablets or capsules to re-educate, rejuvenate and remake our patients.

A CLASSIFICATION OF ORGANOTHERAPEUTIC REMEDIES

Obviously not all of the extracts obtained from the various organs of animals can be expected to be of equal therapeutic merit, nor are they used and recommended with equal frequency; hence, it seems advisable to separate these preparations into several classes:

(A) Those which are of well-known and practically unquestioned therapeutic efficacy;

(B) Those which are not so well known, but which, nevertheless, offer undoubted possibilities in medicine; and

(C) Those which have been used slightly, which are occasionally referred to in medical literature, but as yet have a comparatively limited usage.

With the above in mind, this classification can be made as follows:

Class A

The Better Known Organotherapeutic Remedies

1. Adrenals—I. Medulla
2. Bile
3. Duodenum (Secretin)
4. Mammae
5. Ovaries (Corpus Luteum)
6. Pancreas—I. Pancreatin
7. Pancreas—II. Trypsin
8. Pituitary—I. Posterior Lobe
9. Stomach—I. Pepsin
10. *Thyroid*

Class B

Less Well Known but Useful Products

11. Adrenals—II. Total Gland
12. Adrenals—II. Cortex
13. Blood—1. Hemoglobin
14. Blood—II. Normal Serum (Coagulose)
15. Blood—III. Antithyroid Serum
16. Blood—IV. Leucocyte Extract
17. Bone Medulla
18. Brain (and Spinal Cord)—I. Lecithin
19. Brain—II. Thromboplastin (Kephalin)
20. Kidneys
21. Liver
22. Lymphatic Glands
23. Pancreas—III. Total Gland
24. Pancreas—IV. Langerhans Islets
25. Parathyroids
26. Placenta
27. Pituitary Body—II. Total Gland
28. Pituitary Body—III. Anterior Lobe
29. Prostate
30. Spleen—I. Total Gland
31. Spleen—II. Peristaltic Hormone
32. Testes (Orchic)
33. Thymus—I. Total Gland
34. Thymus—II. Nuclein (Nucleinic Acid)

Class C

Extracts Used Infrequently

35. Appendix Vermiformis
36. Bone
37. Brain and Cord—III. Total Substance

38. Lung
39. Parotid
40. Pineal Body
41. Stomach—II. Gastrin
42. Tonsils

Of course it should be understood that this is quite an arbitrary classification, made merely as means of noting at a glance the writer's idea of the comparative therapeutic availability of an extract.

In the pages which follow the reader will be able to distinguish quickly the class to which any given preparation belongs. It may be added that the following outlines comprise the majority of the indications and suggestions found in current medical literature; and for further convenience the less well-known indications have been separated from the principal ones.

Class A

THE BETTER KNOWN ORGANO-THERAPEUTIC REMEDIES

---

1. THE ADRENAL GLANDS

I. The Medulla A

Source and Form. The suprarenal capsules of various animals, chiefly from cattle. Available in powdered form; but generally used in the form of the active principle, adrenalin, isolated by Takamine in 1901, and obtainable as a crystalline powder or, most commonly, in the form of a 1:1000 solution of the chloride. (Synthetic preparations of identical or closely allied chemical composition are now made.)

Physiologic Relations and Action. The adrenal medulla, intimately concerned in the control of the sympathetic nervous system, exercises an essentially vascular function, in contradistinction to the cortex, which has an antitoxic function. Acute adrenal insufficiencies frequently supervene in severe infectious diseases, especially typhoid fever and cholera. Pain (as well as the other emotions, i. e., fear, rage, etc.) is believed to cause an increased elimination of the active principle of the adrenal medulla (adrenin), with a resultant increased action and after adrenal exhaustion, muscular asthenia and vascular atonicity supervene. Adrenalin in extremely small doses, contracts the blood vessels when applied locally or given internally, by acting upon their nerve terminals. It also stimulates to contraction many groups of unstriated muscle (uterine muscle is a notable exception) and exerts a particular influence upon cardiac muscle, increasing its tone and enlarging the output of the left ventricle during systole. This, with the constricting action on the vessels, causes the rise in blood pressure which follows its increased production or its administration.

Principal Therapeutic Indications. These are necessarily divided under two headings: (1) Its local effect—as a vasoconstrictor in conditions of congestion or local hemorrhage. These include: Conjunctivitis, coryza, eczema, epistaxis, hay fever, hematemesis, hematuria, hemorrhoids, iritis, keratitis, laryngitis, pruritus, rhinitis, tonsillitis, urethritis and as a vaso-constrictor during local operations, etc. (2) Its general effect—as a means of controlling conditions due to disturbed vasomotor equilibrium and to hypoadrenia, where the work of the chromaffin tissue (adrenal medulla) seems to have been more especially affected. Among these are: Asthma and bronchial spasm, Addison's disease (see also page 56), cholera, collapse and shock during severe infectious diseases and from other causes, dysentery, Graves's disease, heart failure, osteomalacia, vomiting of pregnancy, etc.

Other Minor Indications. Adrenalin has been recommended in snake bite (locally and internally) and other forms of poisoning, especially by strychnine; and similarly to prevent the so-called "nitroid crises" which occasionally accompany arsphenamine (salvarsan) injections. It is also used in the control of certain vascular dermatoses as herpetic purpura, angioneurotic edema and urticaria. Recently it has been used successfully in Bright's disease, especially in children.

Contraindications. All save the slightest degrees of hemoptysis; extreme hypertension; diabetes mellitus and pancreatic insufficiency.

Synergists. In local surgery adrenalin is commonly used with cocaine, novocaine, etc.; in asthma it has been recommended (Zueblin) with pituitrin.

Administration and Dosage. Adrenal medullary substance in powder or tablets, 1-10th to ¼th of a grain every hour or, in certain cases, 1 to 2 grains three times a day in chronic conditions. Adrenalin (or similar products), 2 to 10 or occasionally even 15 minims of a 1:1000 solution by mouth, hypodermically, or, in extreme cases, by intravenous injection well diluted with saline solution. Adrenalin solution is recommended to be used as follows: For hypodermic use, 5 to 15 or more minims of a 1:2000 solution injected into the muscles. For intravenous use, 1 or 2 mils. of a 1:5000 solution. For local use a solution of 1:1000, 1:10,000 or even 1:100,000 may be used.

Remarks. Generally speaking, the use of the adrenal (medullary) principle is limited to its local application in minor surgery and for the vasoconstrictor action. The systemic influence is equally important and the use of adrenalin or, better still, desiccated adrenal substance in acute functional adrenal insufficiency is of marked value. In acute cases the active principle is used and in chronic cases total adrenal substance is preferable.

2. BILE[A]

Source and Form. The bile of cattle or hogs, preferably the latter as it more closely resembles the human secretion. Usually available in the fresh state, inspissated (Extractum Fel Bovis) or desiccated (Powd. Bile Salts), the second in the form of pills and the last in powder or enteric-coated tablets. The bile salts are isolated and, if desired, can be used instead of the more crude preparations.

One part of dehydrated bile represents about 39 or 40 parts by weight of the fresh fluid. Extractum Fel Bovis is a heavy, syrupy liquid one part of which represents 8 parts of ox-gall.

Physiologic Relations and Action. Bile is the most effective, physiologic cholagogue. It is a direct antagonist to the conditions which cause intestinal putrefaction and also exerts a specific anticoagulative action upon the mucin in the intestines. It is said to have a slight stimulative action upon the intestinal musculature and to augment the activity of the pancreatic and duodenal enzymes.

Principal Therapeutic Indications. Hepatic and biliary insufficiency and stasis with indigestion, constipation and alimentary autotoxemia; cholecystitis *and cholangitis;* biliary calculi with or without colic; catarrhal jaundice; muco-membranous entero-colitis. In children with fat indigestion, foul stools and anemia it is valuable.

Other Minor Indications. Bile is used as an adjunct in the treatment of a number of nutritional conditions associated with hepatic insufficiency, among them tuberculosis, toxic neurasthenia, migraine, etc. It has also been recommended for hyperpepsia.

Contraindications. Obstructive jaundice.

Synergists. Hepatic substance (q. v.) fits in very well with bile, thus broadening its value. Pancreatin is often used with it. These three remedies may be given together with good prospects of better results than those expected from the single remedies alone.

Administration and Dosage. Two to five grains of the repurified, desiccated product, or 5 to 15 grains of the inspissated ox-gall, taken with or immediately after food. In chronic cases one dose at bedtime is often sufficient, provided it is continued for some weeks or months. In chronic biliary stasis and gallstones it is advisable to continue the administration of bile for months; in acute cases 5 grains may be given every two hours.

Remarks. Bile may be given in keratin- or other enteric-coated pills or tablets, as its action usually is desirable only in the intestine, and when it is given by mouth without protection, it may cause unpleasant belching and slight gastric discomfort. Bile is considered by many French internists to be a virtual specific for mucous colitis or enteritis. In such cases it must be given in ample doses by mouth and supplemented by the bile enema, repeated each night for a number of times. (The bile enema consists of a high colonic injection of 4 or more ounces of warm water in which one dram to one ounce of fresh ox-gall has been mixed. Small amounts are used to start with, gradually increasing each day. Ichthyol or, preferably, Isarol, a similar drug, may often be added with advantage.)

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3. THE DUODENUM [A]

(Secretin)

Source and Form. The upper eighteen inches of the small intestine of pigs. (It has been stated that extracts obtained from the intestines of dogs have a larger and more active secretin content.) It is extracted by means of hydrochloric acid from scrapings from the duodenal mucous substance and is obtainable in the form of powder or solutions (Secretogen, Eukinase, etc.).

One part of the desiccated duodenal extract represents about 12 parts of the fresh scrapings.

Physiologic Relations and Action. Secretin is the so-called "alimentary hormone" discovered by Starling which, he demonstrated, brings about the liberation and activation of the digestive juices and their enzymes from the pancreas. It was later shown that secretin combines with the granules or proferments in the cells and actually forms a part of the completed ferment. Secretin also stimulates the production of bile and succus entericus and increases the capacity of the duodenal walls to produce more prosecretin (the precursor of secretin which is liberated by contact with the HCl in the gastric chyme). It seems to have a slight influence upon peristalsis.

Principal Therapeutic Indications. Indigestion with pancreatic insufficiency associated with clay stools, intestinal putrefaction, autotoxemia and indicanuria; functional indigestions generally including severe digestive disturbances of infants and children (summer diarrhea, marasmus, etc.); following gastro-enterostomy and intestinal short-circuiting. It has also been used in the treatment of torpid liver, hepatic cirrhosis, jaundice and biliary insufficiencies. In cancer where the normal HCl is absent, and hence secretin production is either reduced or absent, secretin may be of value to enhance the digestion.

Other Minor Indications. Secretin has been recommended in certain forms of diabetes, but aside from its action upon digestion, it has no advantage and this phase of its administration has been dropped. It is none the less a most useful remedy in acute and chronic conditions, where digestion and nutrition are in need of improvement.

Contraindications. Duodenal ulcer and pancreatitis. Occasionally it may slightly aggravate hyperchlorhydria.

Synergists. Pepsin, pancreatin and other products influencing digestive activity.

Administration and Dosage. Two to five grains of the repurified duodenal extract (containing secretin), just before meals. In the treatment of infants a portion of a tablet or cachet corresponding to ¼ to ½ a grain of the above should be given with each feeding.

Remarks. A number of writers insist that in experimental work secretin is destroyed in the stomach. It may be said unqualifiedly, however, that there is more than sufficient evidence of a clinical nature to offset this. Of course it is obvious that a remedy given by mouth can not be as immediately or as thoroughly active as when given intravenously, as has been shown by the experimental work done with secretin on dogs.

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4. THE MAMMARY GLANDS[A]

Source and Form. The parenchymatous portion of the udders of cows, goats or ewes. Available in powder or tablet form; and, rarely, in solution for injection.

One part of desiccated mammary substance represents about 4½ parts of the fresh parenchyma.

Physiologic Relations and Action. The internal secretion of the mammae antagonizes that of the corpus luteum and is also antagonized by it; hence it serves to inhibit conditions resulting from undue activity of the ovaries. It exerts a stimulating action upon mammary activity and development. It reduces congestion and oozing and favors uterine *involution after* childbirth.

Principal Therapeutic Indications. Uterine diseases accompanied by hemorrhage, not due to organic causes (such as foreign bodies, cancer, etc.). Menorrhagia and metrorrhagia, with or without other menstrual disturbances. Interstitial metritis, including uterine fibroids. Mammary organotherapy reduces the hemorrhage in a good percentage of cases of fibroids, it also controls the pain and, according to Feodoroff, in an encouraging number of cases reduces the size of the tumor or prevents its growth. Its use has also been suggested in deficient lactation, as an adjuvant to local measures in caked breast (to prevent stasis and increase the flow of milk) and where there is an insufficient development or atrophy of the breasts. It also may be given after parturition to hasten involution of the uterine walls.

Other Minor Indications. Conditions due to ovarian hyperactivity, such as nymphomania, as well as in ovarian and other diseases associated with much pelvic congestion and consequent pain. As a palliative antihemorrhagic in uterine cancer.

Contraindications. Deficient ovarian activity, including infantilism, amenorrhea, etc.

Synergists. Placental extract exerts a similar galactogenic and utero-depletant effect and may be given with mammary substance with advantage. Pituitary gland (total) also exerts a synergistic effect. Other remedies such as ergotin, cotarnine, etc., may be used to augment its styptic action. Recently thymus extract has been recommended.

Administration and Dosage. Two to ten grains twice or three times a day, preferably before or with meals. In the treatment of menorrhagia with or without fibroids this remedy may be continued without interruption for several months, the dose being increased during the flow and reduced during the intervals. In other conditions it may be given for ten days preceding the catamenia, the dose being doubled during the flow. Occasionally mammary extract may cause slight gastric irritability, in which case it should be omitted for several days and the dose reduced and then gradually increased again. If it is given with food this inconvenience is sometimes obviated.

Remarks. Mammary extract is one of the few organotherapeutic agents which can be used to antagonize the results of the excessive activity of another endocrine gland. Ordinarily, organotherapy is most useful in bringing about an increased activity of various internal secretory organs. Mammary extract is an important representative of this class (which has been called the "antihormones"), and deserves to be used much more frequently in many conditions due to or associated with ovarian excess, and before more serious and radical measures are undertaken.

I have noted good results following mammary gland feeding in uterine cancer, the oozing and odor being markedly reduced. Of course this can not be *expected to* modify the actual disease.

5. THE OVARIES[A]

(Corpus Luteum)

Source and Form. Ovarian extract, i. e., extract of the whole ovary, for a time was practically supplanted by extracts of the corpus luteum of pregnancy obtained from cows or sows. Desiccated extracts of the total gland or of corpora lutea alone are available in tablet, capsule or powder form. It is occasionally used by hypodermic injection.

One part of desiccated total ovary represents about 6½ parts of fresh gland, while one part of desiccated corpora lutea represents about 5 parts of fresh substance.

Physiologic Relations and Action. The corpora lutea and ovarian stroma both produce remarkably active internal secretions or hormones which control menstruation and maintain pregnancy in the early months. They also regulate metabolism, more especially the oxidation processes of the body. The administration of suitable preparations of ovary or corpus luteum stimulates the secretory activity of the ovaries and regulates the menses and those conditions dependent upon this phenomenon.

Principal Therapeutic Indications. (1) Organic ovarian deficiency: To replace the normal ovarian hormone action when the ovaries are destroyed by disease, removed by operation, inactive due to congenital maldevelopment or physiologically reduced by the menopause. Its administration counteracts the nervous, mental and circulatory disturbances so commonly associated with such changes, and in conditions of infantilism, it favors the development of the reproductive organs and the establishment of their activities. (2) Functional ovarian deficiencies: Menstrual disorders due to reduced ovarian activity caused either by local disease in or near the ovaries or as a result of a diminution in the stimuli normally received from the intimately associated ductless glands (thyroid, pituitary, etc.). This includes amenorrhea and certain forms of dysmenorrhea. Neuroses, especially the so-called "reflex neuroses" (including palpitation, dizziness, insomnia, depression, excitation and certain functional mental disturbances); nutritional disturbances associated with ovarian disease (obesity, anemia, certain forms of rheumatism, dermatoses, etc.); circulatory disturbances resulting from ovarian disorder including "flashes of heat," local congestion, cardiac irritability, irregular pulse, etc.

Other Minor Indications. Ovarian extract has been recommended in osteomalacia (with which infantilism may be associated), Graves's disease, neurasthenia and epilepsy, especially that form which is associated with, and aggravated by, the menses. Sterility of functional origin, and repeated abortions not due to organic disease or mechanical factors. Hyperemesis in early pregnancy, in which case the solution of the luteal principle is given hypodermically.

Contraindications. Pregnancy. Conditions of ovarian hyperactivity, such as mental and nervous hyperexcitability (of a sexual character); extreme pelvic congestion (though occasionally this form of treatment may be beneficial in such cases); nymphomania, etc.

Synergists. Quite the most important synergist is thyroid extract, and it may be given in conjunction with ovary with advantage in practically every case (save hyperthyroidism). Pituitary gland (total) is also used with this extract.

Administration and Dosage. Two to five grains of total ovary or desiccated corpora lutea, increasing to fifteen or twenty grains twice a day—at morning on rising and just before bedtime. Commonly given three times a day, between meals. In chronic conditions the medication should be begun immediately after the menstruation ceases, in order to affect the succeeding period, increasing the dose two or three days before the period is due. It is advisable to discontinue it during the flow; and in many cases to prolong the treatment for months, gradually reducing the length of time during which it is taken each month. The hypodermic solution of the corpus luteum principle is given in daily doses of 1 mil. equal to 3 grains of desiccated substance. Six or eight injections are said to be usually enough.

Remarks. There seems to be no advantage in giving corpus luteum other than by mouth, except in the somewhat rare instance mentioned above.

6. THE PANCREAS

I. Pancreatin ᴬ

Source and Form. The desiccated and extracted acinous portion of the pancreas gland from cattle or hogs. Usually secured in a standardized powder and dispensed in capsules (it is hygroscopic and deteriorates when damp.)

Physiologic Relations and Action. The pancreas produces three well-known ferments—trypsin, steapsin and amylopsin, which are capable of splitting up for digestion, proteids, fats and carbohydrates respectively. Pancreatic digestion is carried on in the small intestine and is an important factor in stimulating hepatic activity, hence there is also a "reflex value" from the use of pancreatin in hepatobiliary insufficiency. Pancreatin is rendered temporarily inert by the gastric juice but undoubtedly it regains its activity as soon as it reaches an alkaline medium in the small intestine.

Principal Therapeutic Indications. The original use for pancreatin was in the peptonization of milk for feeding infants and invalids. It is chiefly used in the disorders of digestion, to augment the work of a faulty or overworked pancreas. The individual ferments are easily obtainable, and so far as the ferment value is concerned are gradually superseding the total pancreatic extract which is used for another purpose. The most important of them —trypsin—is considered separately (q. v.).

Other Minor Indications. Pancreatin is frequently recommended in tuberculosis. Brieger finds that its "power to lower the anti-tryptic index" is of extreme value in tuberculosis, cancer and, to a certain extent, in pernicious anemia. Certain forms of infantilism with obvious manifestations of pancreas insufficiency are benefited. (Bramwell)

Synergists. Other digestive ferments, pepsin, bile salts, etc.

Administration and Dosage. Three to ten grains is an average dose. It is best given one hour after meals and repeated still one hour later.

Remarks. From a strictly chemical or pharmacological standpoint it may seem inadvisable to give pancreatin by mouth or to combine it with other ferments. However clinical results count for more in practical medicine, and the immense quantities of pancreatin made and dispensed are evidence in its favor. The two authorities mentioned above, as well as many others, specifically advise its administration by mouth and Brieger recommends that "no attempt be made to protect pancreatin from the digestive fluids, merely giving the powder on the end of a knife blade." (Med. Record Feb. 1, 1913.) Pancreatin is frequently given in enteric-coated pills or tablets to obviate the supposed destructive action of the gastric juice.

7. THE PANCREAS

II. Trypsin [A]

Source and Form. Same as pancreatin. Four times more active than Pancreatin U. S. P. Obtainable in powder or standard solutions of it.

Physiologic Action. Digests proteid material. Increases "the powers of resistance," especially against tuberculosis. (It is suggested that this may be due to augmented digesting powers of the individual leucocytes.)

Principal Therapeutic Indications. (1) Local: As a "diphtheria solvent"; in abscesses, ulcers and sinuses to clear out purulent, dead tissue; by direct injection into tubercular abscesses. (2) General: In tuberculosis, cancer and, of course, in digestive disorders with proteid putrefaction, to increase intestinal digestion and also to enhance the phagocytic powers of the leucocytes.

Administration and Dosage. (1) A 10 per cent glycerine solution is generally used. It is first diluted and injected in increasing doses, commencing with 5 minims (plus a suitable amount of saline solution) and increasing to 20 minims or more. Trypsin solutions are used for topical application, a special "Lotio Pancreatis" (Fairchild's) being recommended for this purpose. (2) One to five grains of the powdered trypsin, administered during or after meals. In tuberculosis 20 to 25 grains a day, in divided doses.

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8. THE PITUITARY BODY

I. Posterior Lobe: the Infundibulum[A]

Source and Form. The small, posterior lobe of the hypophysis cerebri of cattle. Desiccated extracts are available in powder or tablet form; but re *not often* used since extremely active, standardized solutions of the purified principle may be secured in ampules.

One part of desiccated posterior lobe substance represents about 4 to 4½ parts of the fresh gland.

Physiologic Relations and Action. The posterior lobe of the pituitary body is quite unlike its neighbor, the anterior lobe, for it does not have the same glandular structure or action. It may be removed with impunity, which is not the case with the anterior lobe. However, it contains an extremely active substance which exerts a general stimulating influence upon unstriped muscle which is especially marked on the pregnant uterus. It also is an excellent stimulant of renal secretion and mammary activity, and seems to favor carbohydrate metabolism. It is one of the most remarkable of the organotherapeutic extracts and its physiologic action is evident in a widely varying range of clinical cases.

Principal Therapeutic Indications. The solution of the infundibular principle (pituitary liquid, pituitrin, infundin, etc.) is used to hasten labor after the second stage has commenced. It facilitates expulsion and it is claimed that recourse to forceps is obviated in 80 per cent. of those cases where instruments ordinarily would have been used. When injected intramuscularly or hypodermically (preferably the former) in many cases, especially where asthenia is present, it causes a prolonged rise of blood pressure, at the same time strengthening the heart, hence it is most useful in shock, cardiac weakness and heart failure (including myocarditis) and other organic conditions associated with reduced blood pressure. For this reason it has been given alone, or in conjunction with adrenal substance in Addison's disease. It stimulates the musculature of the milk ducts in the mammae, and also it seems, the secretory activity in a lesser degree. It has been used in hypogalactia and as a preventtive of this condition. It is a marked diuretic and is therefore used in uremia, anuria, dropsy and wherever renal activity needs to be stimulated. Paradoxically, diabetes insipidus is most satisfactorily controlled by injections of this principle. Its influence on unstriped muscle includes the musculature of the whole intestinal canal, and it is administered with great success in meteorism, especially following laparotomy. It is said to be more immediately successful in fecal impaction and acute intestinal stoppage with or without paresis, than any other remedy. The "heart value" of pituitary solution is important, especially in hyperthyroidism.

Other Minor Indications. It favors uterine involution and is not infrequently used as a postpartum remedy to control hemorrhage and reduce subinvolution. Since it stimulates the mammary glands it is of prospective value in threatening mammary abscess. It has been used in bronchial asthma in conjunction with adrenalin. Recently recommended in enuresis in children.

Contraindications. It is particularly important *not to give* posterior pituitary solutions in the early stages of labor, since rupture of the uterus is quite possible. Obvious obstruction of any kind, such as dystocia (fetal or maternal), malposition, etc. Hypertension is another important contraindication and severe nephritis has been mentioned as a possible deterrent to its use. When used for its effect upon the intestines perforation or rupture is not impossible under certain circumstances.

Synergists. Adrenalin, as already noted.

Administration and Dosage. One half to one mil. of a standardized 20 per cent. solution representing 0.20 grams of fresh posterior lobe. These solutions are now put out in ampules containing ½ and 1 mil. of a solution which has been standardized to exert a certain definite influence upon muscle. Smaller doses more frequently repeated are recommended by some—2 to 5 minims. Intramuscular injection is preferred to the subcutaneous method, and the intravenous route is commonly used but has no great advantage over the other method. When given by mouth 1 to 5 mils. may be used, but here it is usually given in powder or tablets containing ½ to 3 grains, 3 or 4 times a day, and continued for some time. (As much as 15 or 30 grains three times a day has been given with benefit.)

Remarks. Pituitary solutions have entirely superseded adrenalin in the control of shock and acute cardiac conditions, since its action is more satisfactory and persists for a much longer period. Morphine counteracts it; if opiates have been given previous to its administration, it is necessary to increase the dose of pituitary. A second dose of ½ or 1 mil. may be given during labor, 45 to 60 minutes after the first injection.

9. THE STOMACH

I. Pepsin A

Source and Form. The mucous membrane of the stomach of hogs. Pepsin is principally prepared in thin scales, and is rarely given alone in the dry form. It is more frequently administered with hydrochloric acid of suitable strength or in elixir or tablet form alone or with suitable adjuvant remedies.

Physiologic Action. Pepsin digests proteids in an acid medium.

Principal Therapeutic Indications. Dyspepsia, hypopepsia and conditions in which gastric digestion is defective; pyloric stenosis with retention; gastric dilatation with butyric fermentation, etc.

Other Minor Indications. Pepsin is frequently used in vehicles in which various standard drugs are administered. Solutions of it (with HCl) are also recommended as a vulnerary.

Synergists. HCl, pancreatin, etc.

Administration and Dosage. Two to five grains before meals, preferably in 1 or more drams of a 0.2 per cent solution of hydrochloric acid.

Remarks. Pepsin is at best a makeshift and a number of reports indicate that as a result of its continued use, the stomach "becomes lazy." **In my** *estimation* the philosophy of its therapeutic value is not nearly so rational as that of secretin (see page 34). It is, however, a splendid remedy to **start** the treatment of foul gastric conditions.

Gastric juice obtained from pigs or dogs is on the market and is used for precisely the same purpose as the more easily obtained pepsin-hydrochloric acid mixtures.

10. THE THYROID GLAND[A]

Source and Form. The thyroid glands of young sheep and lambs. It seems best that these sheep should come from flocks grazed near the sea. Various preparations of thyroid extract are officially known in the majority of the Pharmacopoeias. In the U. S. P. IX appears the following: "The thyroid glands of animals (in U. S. P. VIII, sheep) which are used for food by man, freed from connective tissue and fat, dried and powdered, and containing not less than 0.17 per cent nor more than 0.23 per cent. of iodine in thyroid combination." It is available in powder or tablets and is occasionally prescribed in liquid form for administration by mouth. The tablets are used by far the most frequently.

One part of desiccated thyroid (U. S. P. VIII) represents approximately 5 parts of the fresh glands; the U. S. P. IX preparation is slightly different, one part of dried substance corresponding to about 5½ or 6 parts of fresh glands.

Physiologic Relations and Action. The thyroid is probably the most important of the ductless glands, as it is the most thoroughly studied. It is responsible for the establishment and maintenance of many of the metabolic activities of the body. It favors oxidation, controls growth both physical and mental and is very closely related to practically all of the other glands of internal secretion, particularly the gonads, adrenals, pituitary and thymus. The thyroid is one of the chief detoxicating agencies of the body and is also intimately concerned in the immunity-producing mechanism.

Principal Therapeutic Indications. (1) Major hypothyroidism: This includes organic conditions where there is congenital absence or pathological destruction of the thyroid gland, as in myxedema, cretinism, etc.; and certain conditions demonstrated to be due to a combination of endocrine conditions in which defective thyroid action is prominent, such as infantilism, mongolism, certain mental disorders and forms of insanity, obesity, anemia, etc. (2) Minor hypothyroidism: A very large class of metabolic disorders is included under this heading. Among them are many dermatoses, chief of which are pruritus, prurigo, ichthyosis, pityriasis rubra, scleroderma, psoriasis and even lupus. Various ovarian disorders are reflexly influenced by thyroid therapy and it is recommended in dysmenorrhea, amenorrhea, mastodynia, chlorosis and certain climacteric disturbances alone or in conjunction with ovarian substance. It has also been suggested in hyperemesis gravidarum, uremic convulsions of pregnancy and puerperal eclampsia. In simple goiter without evidence of thyroidism (use my Thyroid Function Test—see Chapter V of the Appendix) thyroid extract may act as a specific. It is recommended in certain phases and symptoms of insanity including hysteria, melancholia, dementia and other psychoses, particularly those associated with thyroid disease or the menopause. Among other numerous conditions in which it is frequently used with varying degrees of success are the several forms of rheumatism, arthritis, defective oxidation as in obesity, migraine and even arteriosclerosis. It is also useful in vaso-motor conditions chief among which are chilblains and Raynaud's disease.

Suboxidation usually calls for thyroid therapy. Malnutrition and reduced circulatory efficiency (hyposphyxia) with undue sensitiveness to cold, cold extremities, hypotension, etc., often benefit from thyroid and other synergistic gland extracts. In conditions of asthenia and senility, one may expect to encounter waning thyroid function, and thyroid will help very much. According to a famous New York specialist, in elderly persons a quarter or half a grain of thyroid a day "helps to keep the arteries soft," presumably by enhancing metabolism and thus reducing the toxemia incident to the slowed chemical and hormonic functions of normal or premature old age.

Other Minor Indications. Thyroid extract has been used in an almost innumerable number of conditions supposed to be in some way due to thyroid disorder among those not already mentioned are torticollis, Dupuytren's contracture, hemophilia, uterine fibroids, rickets, enuresis, nephritis and progressive muscular atrophy. The results are often astonishing despite the prospect and very often the empirical use of thyroid has accomplished more than the most careful and scientific treatment.

Under the heading "Unclassified Uses of Thyroid" several unusual uses for thyroid are enumerated in "The Handbook of Therapy"*:

"Thyroid has been used with success in some instances of hemophilia and purpura hemorrhagica, as well as in the irregular hemorrhages of the menopause. It has been used in chronic rheumatism, especially where the attacks showed a general disturbance of metabolism, such as at one time an asthmatic attack, at another an indigestion attack, and at another a typical gouty joint attack. Small doses given for a considerable time are often successful in this kind of metabolic disturbance.

"Sometimes thyroid acts as a diuretic, and it certainly is an antidote to nitrogenous poisoning in insufficient kidney action. Even uremic convulsions are sometimes kept in abeyance by the administration of thyroid. During a uremic attack the dose of thyroid should be large, as 10 grains of the dried extract three times a day. Such treatment sometimes apparently prevents convulsions and in some instances seems to aid in saving life.

***This excellent text book, published by the American Medical Association, is noted for its conservatism so it *seemed* advisable to make the quotation verbatim.**

"If not otherwise contraindicated, whenever there is excessive connective tissue development in any organ—in other words, a sclerosis or cirrhosis—a small dose of thyroid daily is of benefit. The dose should be so small that it could not cause evident signs of its physiologic activity. In many of these instances small doses of iodid, given daily for long periods, may be of as much benefit.

"Some clinicians have certified to, and even proved, in certain instances, the value of thyroid in inhibiting or causing resorption of carcinomatous growth. This is especially true of uterine carcinoma. The majority of investigators, however, have not found this treatment successful."

Contraindications. Thyroid extract is theoretically (and in the majority of cases, practically) contraindicated in hyperthyroidism and Graves's disease. It is also contraindicated in rapid heart, palpitation and breathlessness.

Synergists. Very small doses of iodine, or iodides, frequently enhance the activity of thyroid extract, especially in simple goiter. Nucleinic acid.

Thyroid is "the great organotherapeutic synergist," small doses frequently adding much to the therapeutic values of many other glandular extracts.

Administration and Dosage. The dosage of thyroid is very variable, but generally speaking much less than is usually recommended (in a recent U. S. Pharmacopoeia the dose was stated as 5 to 10 grains). The French method of giving 0.1 gm. a day in divided doses is excellent. One-tenth to one-fourth of a grain very frequently is enough in conditions of minor hypothyroidism, while there is no definite dosage for the disorders resulting from an inactive or absent thyroid. Sometimes in such cases 1 grain three times a day will suffice, at other times, even in children, 10 or more grains a day can be easily tolerated. The dosage for each patient must be adjusted to the individual idiosyncrasies.

A word of warning should be given here about thyroid dosage. A well-known brand of thyroid tabloids is dosed on a basis of **fresh** gland substance, i. e., the content is really less than those of other makes for five parts of fresh substance is equal to one of the finished powder. There is danger in overlooking this for an inadvertent change from tabloids to tablets may multiply the dose by five.

Remarks. The evidences of over-dosage (thyroidism) are irritability both nervous and cardiac, tachycardia, insomnia with headache, slight tremor of the fingers, prostration and pains in the back and limbs. Such indications call for a removal of all thyroid extract and after, say, a week or less, the re-establishment of the medication in much smaller dosages. The proper dosage is sometimes only reached gradually. Frequently as much as 1 to 3 grains may be given to susceptible persons in a single dose just before bedtime. It is extremely important to avoid the indiscriminate use of thyroid extract (as, for example, in obesity) and it should only be taken under the most careful medi*cal supervision.*

Class B

LESS WELL KNOWN BUT USEFUL PREPARATIONS

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11. THE ADRENAL GLANDS

II. Total Substance[B]

Source and Form. The suprarenal capusles of various animals, chiefly of cattle. Available in powder or tablet form. One part of adrenal powder represents about 6 parts of fresh gland.

Physiologic Relations and Action. The adrenal glands through their hormones maintain the tonicity of the involuntary muscles including those of the circulatory system, hence cardio-vascular tone and blood pressure is largely dependent upon adrenal activity. Adrenal disease (first described by Addison and named after him) is invariably accompanied by severe asthenia, great muscular weakness and circulatory inefficiency. These same manifestations in lesser degree may result from functional adrenal insufficiency, a very common condition, since the adrenals have been shown to be stimulated by emotional strain (pain, fear, rage, worry, etc.), by abnormal endocrine function elsewhere in the body (especially hyperthyroidism) and by toxemia. There is a more or less well-marked adrenal phase to every infection and infectious disease. The outcome of severe and heavily toxic diseases, as pneumonia, cholera, etc., is a condition of acute adrenal depletion which might properly be called "acute Addison's disease." This differs from the Addisonian syndrome only in the degree and persistence of the symptoms, and the fact that in the latter there is permanent destruction of the adrenal structure.

Without a doubt the adrenals are concerned in all long-standing chronic infections, and tuberculosis is a typical example of this. Here again we find the adrenal trinity—asthenia, hypotension and malnutrition.

Principal Therapeutic Indications. Asthenia, easy fatigue, muscular atony (myasthenia) and all conditions of a "run-down" nature; cardiac insufficiency with circulatory stasis, hypotension, cold extremities or the so-called syndrome of "hyposphyxia"; malnutrition, especially accompanying or following conditions which obviously are due to or associated with hypoadrenia.

Addison's disease is temporarily amenable to adrenal gland feeding, and the symptoms already enumerated are often very satisfactorily controlled in this way. The actual progress of the disease is not stayed. The symptoms of Graves's disease may be reduced very materially by adrenal feeding, especially if it is combined with suitable remedies.

Other Minor Indications. Some French writers recommend adrenal gland alone or in conjunction with other organotherapeutic synergists in tuberculosis, paludism and cachexia. There is undoubtedly a class of cases who unconsciously are sub-normal from an adrenal standpoint (they have "minor adrenal insufficiency" just as we find "minor thyroid insufficiency"); these individuals are particularly susceptible to stress—emotional, physical or toxic, and are especially responsive to adrenal therapy.

Contraindications. Diabetes mellitus and glycosuria; vascular disease such as atheroma, aneurysm, purpura, etc.; conditions of severe sympathetic irritability (hyperadrenia) and in hypertension.

Synergists. The glandular extracts which exert a musculo-tonic or dynamogenic influence (gonads, thyroid, pituitary) are often given with total adrenal substance. Dynamic pluriglandular therapy is a well-established procedure. (See Appendix.)

Administration and Dosage. One half to 2½ grains three or four times a day, before meals. In myocardial cases it may be well to give, say, one grain a day for a few days, then to increase the dose very gradually until as high as 10 grains a day are being given. In Addison's disease 5 or more grains may be given at a dose; and the interrelation of these glands should be borne in mind and suitable additions to the adrenal feeding be made to make up for the other endocrine deficiencies which invariably accompany the serious disorganization of such important organs as the adrenals.

Remarks. Adrenal substance is much more gradual in its action than adrenalin, and hence must be given for prolonged periods. On the other hand, while adrenalin injections may be immediately helpful in severe hypoadrenia accompanying febrile conditions, etc., its action is very ephemeral and the ultimate benefit of such gland feeding is better. Of course both may be used simultaneously. Adrenal substance is useless in asthma.

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12. THE ADRENAL GLANDS

III. The Cortex B

Source and Form. The suprarenal capsules of cattle from which the medullary portion (which has quite a different histological structure) has been removed previously. Available in powder and tablet form. One part of the powder represents about 5½ or 6 parts of the fresh cortex.

Physiologic Relations and Action. The adrenal cortex, or interrenal gland, exerts an essentially antitoxic function and also has been shown to be concerned in the control of the development of the gonads. Reports show that in Addison's disease the tissue destruction may be confined to the cortex alone. It is probable that the better effect of total adrenal substance as compared with adrenalin in Addison's disease and the control of the adrenal symptom-complex—asthenia, hypotension and malnutrition—is largely due to the corticular elements present. The effect of adrenal feeding in gonad insufficiency, especially in elderly men, is doubtless due to the functional relationship of the adrenal cortex and the gonads.

Principal Therapeutic Indications. While rarely *used alone there* are a few reports in the literature telling of good effects following the oral administration of desiccated adrenal cortex. It is suggested in conditions due to defective gonad development. It has been given in Addison's disease alone and to supplement total adrenal gland feeding (q. v.). It has also been recommended in certain osseous developmental dystrophies including osteomalacia and to hasten the retarded joining of fractures.

Other Minor Indications. Adrenal cortex has been given successfully in aspermia and it has also been recommended in developmental impotence. Based on results in such cases some have used it in functional impotence, especially in the male.

Synergists. Usually given with the medullary substance as "total gland." Theoretically it should fit in well with spermin and orchic substance, and also with corpus luteum or total ovary, especially in organic or developmental cases.

Administration and Dosage. Two to 5 or more grains three times a day. Four grains a day was the dose used successfully in the condition of aspermia mentioned above.

Remarks. Some writers insist that the cortex of the adrenals is of greater importance than the medulla, and Biedl urges that the cortex is quite essential to life and not the medulla. Attention should be called to the peculiar clinical relationship of precocious gonad development and function in hypernephroma in children.

13. THE BLOOD

I. Hemoglobin [B]

Source and Form. The red blood cells of cattle, usually. Available as a fine, impalpable powder or in tablets with or without associated remedies. It is occasionally used in France in a syrup.

One liter of fresh blood contains about 167 grams of hemoglobin, while 100 parts by weight of red blood cells contains 31 per cent. of hemoglobin. (Hemoglobin represents 90 per cent. of the solids of the erythrocytes.) The percentage of actual iron is 0.336.

Physiologic Action. Hemoglobin is a natural form of organic iron and constitutes about nine-tenths of the red blood cells. It is considered to be the most easily assimilable iron obtainable. Its administration stimulates an increase in the production of hemoglobin as well as the number of erythrocytes. According to Potter, "the action of iron is to cause an increase of the hemoglobin of the red corpuscles either by its direct conversion into an ingredient of hemoglobin, or by stimulating the functional activity of the hematopoietic organs, or perhaps by both means combined." The French insist that hemoglobin, hematin and hemochromogen are more than easily assimilable forms of organic iron, they believe that they exert a typical homostimulant organotherapeutic influence or as Potter puts it in the statement quoted above "stimulating the functional activity of the hematopoietic *organs.*"

Principal Therapeutic Indications. All forms of anemia, including chlorosis; malnutrition; chorea; hypothyroidism, especially in children; syphilitic and cancerous cachexia; following operations where there has been a severe loss of blood and, generally speaking, wherever iron medication is indicated.

Synergists. Thyroid is often useful, especially where the anemia is accompanied by signs of hypothyroidism. Spleen extract and bone marrow may be given with hemoglobin with benefit.

Nucleinic acid (nuclein)—see page 89—is another effective synergist in reduced blood efficiency—low Hgb.-index and poor resistance to infection.

Administration and Dosage. Three to five grains three times a day, half an hour before meals. As little as 1½ grains a day is claimed to render decided hematinic service.

Remarks. Hemoglobin has an advantage over the majority of iron preparations in that it does not cause constipation, and is easily and thoroughly assimilated. In the nocturnal incontinence of children (especially in the illy-nourished) a combination of hemoglobin and thyroid is effective.

14. THE BLOOD

II. Normal Serum [B]

Source and Form. The blood serum of healthy normal horses. It may be obtained in ampules or syringes for immediate use. Another product of blood serum is an anhydrous powder (coagulose) made by precipitating normal serum. This is soluble in water and may be obtained in powder form or in bulbs containing 1 mils. of a solution. Still another similar product is called Hemoplastin.

Physiologic Action. There are certain ferments and similar substances in blood serum which favor the re-establishment of more nearly normal blood conditions, especially in cases with (1) local or general infective conditions and (2) hemophilia and other manifestations of hemorrhagic disease.

Principal Therapeutic Indications. All hemorrhages due to defective clotting of the blood, including hemophilia, melena neonatorum, purpura hemorrhagica; postoperative hemorrhage; gastro-intestinal and genito-urinary hemorrhage and hemoptysis. To facilitate healing and control infection in superficial wounds and also as a tampon or pack in puerperal sepsis.

Other Minor Indications. Normal serum is occasionally used as an immune serum in certain forms of sepsis, including septic pneumonia, typhoid and acute rheumatic fever where definite antisera are not available. Used occasionally in leukemia.

Contraindications. Apparently the dangers due to anaphylaxis are now overcome, especially when one uses the non-toxic precipitate mentioned above.

Administration and Dosage. Local: By direct application once or twice a day—fresh serum may be used. When given to control gastric or duodenal conditions, 50 to 100 mils., by mouth, repeated as needed. General: 15 to 30 mils. injected sub*cutaneously* once a day, or every six hours, depending upon the reaction to the medication, and the severity of the condition. In urgent cases the contents of two ampules (each containing 15 mils.) given intravenously, and repeated in several hours if need be.

Remarks. An increasingly valuable method of treatment in otherwise hopeless cases. The use of the redissolved precipitate seems to have entirely overcome the real dangers of anaphylaxis. It is also valuable where there is a persistent oozing following intranasal and tonsillar operations.

15. THE BLOOD

III. Antithyroid Serum [B]

Source and Form. The blood serum of thyroidectomized horses or sheep, taken about four or five weeks after the operation. Obtainable fresh (rarely used), in powder or in solutions of the powder.

Physiologic Action. It is presumed that after the thyroid is removed, the blood becomes surcharged with the elements normally held in check by the hormones of the thyroid. These substances are thought to neutralize the toxic products of excessive thyroid activity.

Principal Therapeutic Indications. Thyroid hypersecretion (thyroidism); Graves's disease or exophthalmic goiter; thyroid tachycardia; etc.

Synergists. Desiccated pancreas gland to antagonize the adrenal irritability common in hyperthyroidism; adrenal and pituitary substances to slow and steady cardiac action.

Administration and Dosage. Five-grain capsules of the powder are available, of which 2 to 4 may be given daily for a long period.

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16. THE BLOOD

IV. Leucocyte Extract [B]

Source and Form. Prepared from a sterile exudate artificially produced in the pleural cavities of rabbits, horses or other animals by the injection of a suitable irritant solution. The exudate is aspirated and the cellular sediment separated by centrifuging, then extracted in distilled water and incubated. Available in ampule form.

Physiologic Action. Experimental and clinical data indicate that this extract brings about a decided artificial immunity in or against various infectious diseases, due doubtless to an increase in the bacteriotropic action of the blood, as well as to the destruction of the toxins of the infecting micro-organisms. This relieves, in a measure, the overworked leucocytes and tends to protect the higher cells of the animal or person so treated, so that their functions are not deranged by the severe toxemia.

Principal Therapeutic Indications. Severe infections where a definite bacteriological diagnosis is not available—to supplant mixed bacterins in a degree. Clinical data of increasing volume is available and covers the successful treatment of erysipelas and other streptococcic infections, pneumonia (lobar and lobular), various forms of septicemia, pyemia, etc., cerebro-spinal meningitis and severe constitutional infections generally.

Synergists. Hemoglobin where anemia and wasting is marked; nuclein (nucleinic acid).

Administration and Dosage. Given hypodermically usually into the abdominal wall or glutei in doses of 10 mils. once or twice a day. More frequently in extreme cases.

Remarks. This extract must not be considered as taking the place of the well-known antitoxins or vaccines. It has been recommended, however, as a very useful adjunct and may be used in connection with them in many severe infections.

17. BONE MEDULLA ^{B}

Source and Form. The medullary portion of the long bones of very young (preferably fetal) cattle Available most commonly as a glycerinated extract; also diluted in powder and capsules.

Physiologic Relations and Action. Extract of red bone marrow stimulates the action of the hemopoietic system, increasing both erythrocytosis and leucocytosis.

Principal Therapeutic Indications. Various forms of anemia and malnutrition, including chlorosis, leukemia, post-hemorrhagic and secondary anemias. As an adjunct in the treatment of many disorders of nutrition, such as tuberculosis, Bright's disease, marasmus, etc., in which an increased production of red blood cells and their contained hemoglobin, is desirable. Bone marrow may be used alone or in conjunction with spleen extract in splenic diseases, especially chronic malaria and splenomegaly.

Synergists. Hemoglobin, spleen substance, other hematinic drugs.

Administration and Dosage. One to three drams of the glycerin extract, three or four times a day in milk or carbonated water between meals. The average dose of dry extracts is 5 to 10 grains, 3 or 4 times a day.

Remarks. This preparation does not seem to have any influence upon conditions where the red cell count or hemoglobin is normal.

18. THE BRAIN

I. Lecithin B

Source and Form. The esters of the fatty acids (stearic, oleic, etc.) with choline and phosphorus. Obtained by extraction from egg yolks or, preferably, from brain or spinal cord substance. A brownish, gum-like mass which may be dispensed in solution (glycerin), emulsions or pills.

Physiologic Relations and Action. Lecithin is extremely rich in an easily assimilable form of phosphorus and hence is a food-drug reconstructant of merit. Its introduction into medicine followed a demonstration of its growth-stimulating properties. It is said to be a cerebral and nerve tonic in certain depraved metabolic states.

Principal Therapeutic Indications. Debility and malnutrition; phosphaturia; neurasthenia and "nervous prostration" and conditions sometimes called "loss of nerve energy or tone"; developmental and nutritional defects; chorea and certain forms of mental disorder; functional impotence and premature senility.

Other Minor Indications. As an adjunct in convalescence from acute infectious diseases, etc., the disorders of the climacteric, tuberculosis and marasmus. Also useful with hemoglobin in anemia, etc.

Synergists. Other dynamogenic remedies as adrenal, pituitary, etc.; hematinic products as hemoglobin, nucleinic acid and, occasionally, as an adjuvant to thyroid.

Administration and Dosage. Lecithin contains approximately 4 or 5 per cent of organic phosphorus and is given in doses of ½ to 3 grains, between meals, three times a day. This represents 1-50th to ⅛th of a grain of phosphorus per dose. Glycerin solutions are also available, each dram representing 1-25th grain of phosphorus.

Remarks. "Undoubtedly the most useful and best form of phosphorus in clinical use today." Brain and spinal cord substance (q. v.) are largely useful on account of their content of organic phosphorus.

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19. THE BRAIN (ctd.)

II. Thromboplastin ^{B}

(Kephalin)

Source and Form. An emulsion of the white matter of the brains of cattle in saline solution, preserved with trikresol.

Physiologic Action. The lipoids of brain have been shown to activate the clotting power of the blood when applied locally to the bleeding surface.

Principal Therapeutic Indications. The original use of thromboplastin was its local application following tonsillectomy, adenotomy and other operations on the nose and throat. It has since been extended to many other conditions of local hemorrhage and, especially, oozing. For instance, following labor where there is a persistent oozing; after curettage; in cervical carcinoma, etc. In dentistry after extensive extractions. In hemorrhage from the umbilicus, melena and purpura-like hemorrhages of earliest infancy.

Other Minor Indications. The local hemostatic value of thromboplastin (kephalin) has been used satisfactorily in vesical or reno-pelvic bleeding; for local application (per os) in gastric ulcer and (per rectum) for hemorrhoids and rectal bleeding and in certain surgical operations as breast amputation or varicose vein excision where extensive areas are opened and liable to prolonged bleeding or oozing.

Contraindications. Arterial bleeding.

Administration and Dosage. The emulsion of thromboplastin is swabbed freely on the bleeding area. A pad of gauze soaked in the emulsion may be placed upon the area. It may be replaced as often as needed. Usually one generous application suffices.

Remarks. Many thousands of cases of tonsillectomy and adenotomy have been routinely treated (by the N. Y. City Department of Health) with prophylactic swabbing with thromboplastin, and there can be no doubt of its real hemostatic virtues.

20. THE KIDNEYS [B]

Source and Form. The glomerular substance of the kidneys of cattle, sheep or hogs. Usually available in powder or tablets. (Nephritin.)

One part of dry powder is equal to about 8 parts of fresh substance.

Physiologic Relations and Action. The kidneys are stated to exert a certain specific neutralizing effect in toxemia, with a special influence upon those irritating substances in the blood which affect the kidney glomeruli. It is also said to be a diuretic by acting upon the secretory activity of the tubules of the kidneys.

Principal Therapeutic Indications. Various forms of renal insufficiency including ischuria, anuria, albuminuria and some forms of Bright's disease; in ascites and dropsy due to renal disorder; as an adjunct in uremia.

Other Minor Indications. It has been incidentally noted that kidney extract not only frequently reduces albumin, but also increases the urea output quite considerably.

Administration and Dosage. Five to fifteen grains of desiccated kidney substance in capsules or tablets, three times daily at or immediately after meals. Fresh minced kidneys have been given, but the dry powder is much better tolerated.

21. THE LIVER[B]

Source and Form. The parenchymatous tissue of the liver of cattle or hogs. Available in powder or tablets.

One part of finished product represents approximately 6 parts of fresh liver substance.

Physiologic Relations and Action. The liver, in addition to regulating metabolism, plays an important part in the control of detoxication and from a clinical standpoint, at least, seems to be concerned in the regulation of blood coagulation.

Principal Therapeutic Indications. The homostimlant action of liver substance has been used with success in the treatment of functional hepatic insufficiencies as well as such organic manifestations as atrophic cirrhosis, alcoholic liver, etc. It is also used as an adjunct in cholelithiasis. Its detoxicating powers make it of possible utility in such diseases as gout, rheumatism, etc. Its remarkable antihemorrhagic influence has been used to good advantage in controlling hemoptysis in pulmonary tuberculosis; and in France liver extract is commonly used in the treatment of this disease for in addition to its antihemorrhagic action there is claimed to be a specific detoxicating value which is frequently referred to. It is also used to control other local hemorrhages including hemoptysis, epistaxis and the minor manifestations of hemophilia, petechiae, etc.

Other Minor Indications. There is a form of dia*betes in which* a disturbance of the function of the liver is prominent for which desiccated liver has been recommended. This form, however, is not nearly so common as pancreatic diabetes, and in this latter liver extract seems to aggravate the symptoms.

Contraindications. Pancreatic diabetes.

Synergists. Bile salts, spleen substance and, occasionally, thyroid extract.

Administration and Dosage. In France where this therapeutic procedure originated, the dose recommended is one to four grams (15 to 60 grains) of desiccated liver substance three or four times a day, in the treatment of well-defined hepatic disorder. In less severe conditions a fraction of this amount is effective. It is best administered in cachets just before meals.

Remarks. Liver extract has been used with success in the control of hemorrhages after various other antihemorrhagic remedies had been thoroughly tried and were a failure. Of course this influence is only apparent after several weeks of treatment.

22. THE LYMPHATIC GLANDS ^{B}

Source and Form. The lymph nodes of young cattle. Available in powder or tablet form. (Very hygroscopic.)

One part of dried substance represents about 5 parts of fresh glands.

Physiologic Relations and Action. It has been presumed by some writers that the quite constant enlargement of the tonsils and growth of adenoids in children at a certain age, was a protective act on the part of the body—it required certain substances proliferated in these glands in increasing quantity. The use of preparations of lymphatic glands is merely an attempt to supplement this seemingly necessary activity of the lymphoid tissues of the body.

Principal Therapeutic Indications. In children from five to ten years where the tonsils are enlarged, adenoids are present with the usual associated symptoms. In such cases the mouth breathing and the general nutrition, as well as the size of the enlarged glands were all benefited. Snoring was very often stopped. Also used in the so-called "lymphatic type" of children who are poorly nourished, have enlarged glands in the neck, adenoids, etc., and who bleed easily.

Other Minor Indications. Lymphatic substance is being recommended in "worn-out" individuals as a reconstructive measure in conjunction with orchic substance, etc. It is hard to say how much benefit it may bring about in such cases.

Synergists. Thyroid, especially in "lymphatic" children where hypothyroidism is present; spleen; orchic substance and spermin (in senility); calcium salts in hemophilia.

Administration and Dosage. One half to one grain of the dried glandular substance, gradually increased to 5 grains, three times a day.

Remarks. This method of treatment of children has been tried by a number of physicians, and already there are several encouraging reports in the literature. It seems to be deserving of more extended consideration, especially in children known to be backward as a result of lymphatism, adenoids, etc. In France lymphatic extract is recommended for adenitis, tuberculous adenitis and other similar conditions.

23. THE PANCREAS

II. Total Gland[B]

Source and Form. The acinous tissue of the pancreas of cattle or hogs. Available in powder or soluble extract. One part of desiccated gland represents 5 parts of fresh gland.

Physiologic Relations and Action. The pancreas in addition to its all-important digestive functions is an important gland of internal secretion the chief function of which is to facilitate the metabolism of carbohydrates. (See Islets of Langerhans.) This gland also appears to exert a very definite antagonistic effect upon the internal secretion of the adrenal medulla, in fact Sir Edward Schaefer insists on calling the pancreatic endocrine principle a "chalone" or anti-hormone because of its opposing effect.

Principal Therapeutic Indications. The principal value of total pancreas substance (as compared with the pancreatic ferments, q. v.) is to antagonize hyperfunction of the adrenals. Hence its utility in infections where the irritation of the adrenals by bacterial and other toxins is marked. Functional hypertension may be due to adrenal irritability in which case the pancreas extract may exert a distinct depressor effect. In pancreatic disease it may be given for its homostimulant effect.

Other Minor Indications. There is a form of infantilism described by Bramwell in which desiccated pancreas is of value. Also in conditions of lowered resistance to infection, boils, ulcers, etc., it may be given as a rational adjunct measure. In Graves's disease it sedates the irritability of the sympathetic system thru its anti-adrenal action.

Synergists. In hypertension, small doses of thyroid. In infections, nuclein. In Graves's disease adrenal substance and pituitary (posterior).

Administration and Dosage. Two to ten or more grains of the dried powder given three or four times a day, preferably between meals. The solution is practically only used in experimental work.

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24. PANCREAS

IV. Islets of Langerhans [B]

Source and Form. The splenic end or tail of the pancreas. (Approximately 90 per cent. of the islands of Langerhans are to be found in this location.) Powdered substance or glycerinated extract from which the enzymes which may be present have been removed. Trypsogen is the best-known remedy of this type.

Physiologic Relations and Action. The internal secretion of the pancreas has been called by v. Noorden "the brake to the sugar factory." Whether this is true or not, it exerts a remarkable influence on carbohydrate metabolism either by its antagonism to the capacity of the liver to release sugar (it is generally believed that the adrenal medullary hormone stimulates this, and it is well known that this chromaffin hormone is a direct antagonist of the Langerhansian hormone), or that the internal secretion of the pancreas is directly concerned in facilitating the burning of sugar in the muscles, etc. It also reduces blood pressure.

Principal Therapeutic Indications. Diabetes mellitus of pancreatic origin. Extracts of this character may also be used to antagonize adrenal excess in high blood pressure of alimentary origin. The homostimulative action may possibly be of benefit by favoring the re-establishment of the normal work of the pancreas.

Other Minor Indications. A theory has been advanced by Little which offers some hope of practical application. He uses an extract containing the internal secretion of the pancreas in the treatment of cancer of organs originating in the same blastodermic layer—the endoderm. (See also Total Pituitary and Adrenal Cortex.)

Contraindications. In diabetes due to hepatic disorder, pancreatic organotherapy seems to aggravate the trouble.

Administration and Dosage. There is no definite information regarding dosage for there is no known way of knowing to what extent the internal secretion of the pancreas is deficient. Small quantities of the powder—1 to 2 grains—may be given before meals, and the dose increased at intervals of a few days until 10 or 15 grains are being taken three times a day. Trypsogen is given in doses up to 7 five-grain tablets three times a day. It must be taken for a long period. Cases have taken it for years and seem to benefit by it in a manner quite similar to cretins taking thyroid extract.

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25. THE PARATHYROIDS[B]

Source and Form. The parathyroid glandules of cattle or, occasionally (in France), horses. The desiccated gland is used in capsules or tablets, and a repurified nucleo-proteid solution is also obtainable which may be given by mouth or hypodermically.

One part of powder is equivalent to between 5 and 6 parts of the fresh glandules.

Physiologic Relations and Action. The parathyroids control the destruction of toxic substances which have a special predilection for attacking the nervous system. They are also intimately concerned in the maintenance of calcium metabolism. Their total removal rapidly causes death, which is accompanied by tetany and a serious loss of calcium by the body.

Principal Therapeutic Indications. Parathyroid insufficiency with marked nervous irritability and tetany, either due to inadvertent partial *parathyroidectomy* (in goiter operations) or to parathyroid disease; to act as a detoxicator in certain conditions manifested by nervous and, especially, convulsive conditions such as tetany—spontaneous, postoperative, gastric and infantile; epilepsy; etc. It is principally used in the treatment of Parkinson's disease (paralysis agitans) and its persistent use causes a reduction in muscular rigidity and tremor, and also favors better muscular control of the facies and gait. It also seems to sedate the restlessness and insomnia, a change for the better which is frequently noted quite early in the treatment. It is said that an obvious degree of benefit may be expected in as much as 80 per cent. of the cases thus treated.

Other Minor Indications. Parathyroid therapy has been recommended in Italy for eclampsia, uremia and for toxic convulsive conditions generally. Its has been suggested as of possible value in certain motor neuroses including myoclonia. It has also been used in chorea.

Administration and Dosage. The nucleo-proteid solution (Berkeley) is given hypodermically once daily in doses of 1-50th grain. It may be given in the same dose by mouth, two or three times a day. Desiccated parathyroid gland is probably used more commonly, the average dose being 1-10th to 1-20th grain two or three times a day.

Synergists. Hepatic substance; bile salts and preparations from either gonads; atropin by mouth, 1-200 grain per dose or less and of course, hyoscine hydrobromide as a myosedative.

Remarks. Parathyroid therapy is not usually effective unless persisted in for months and, like many other phases of organotherapy, is purely an adjuvant measure.

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26. THE PLACENTA[B]

Source and Form. The placentae of sheep or cows, preferably the former. Available in powder or tablets.

One part of the dried substance is the equivalent of 6½ parts of placental parenchyma.

Physiologic Relations and Action. According to some the placenta is fairly well established as having an internal secretion, and extracts of it as exerting a certain degree of physiological activity. It favors uterine involution and lactation and, generally, the re-establishment of normal conditions after the puerperium. In this connection it will be remembered that many animals have the habit of devouring the afterbirth, presumably for some definite purpose.

Principal Therapeutic Indications. Placenta extract has been used in agalactia and often causes an increase in the production of milk. It has also been recommended to prevent atrophy of the uterine walls after ovariotomy and to favor uterine involution in chronic hyperplastic metritis due to infection, etc., after labor.

Synergists. Mammary gland; pituitary (total).

Administration and Dosage. Three to ten grains four or more times a day, before meals.

27. THE PITUITARY BODY

II. Total Gland[B]

Source and Form. The complete pituitary body from cattle. This includes the anterior and posterior lobes and the pars intermedia. Total gland substance is obtainable in powder or tablet form, one part being equal to 4½ parts of fresh gland.

Physiologic Relations and Action. The therapeutic action of total pituitary extract is essentially the combined action of the extracts of the two lobes which it includes (see pages 44 and 81). It is a general muscular tonic and, in a lesser degree than the posterior extract, a vascular stimulant, reducing atonicity of unstriped muscle, including that of the heart and intestines. It is also claimed to be a useful physiologic diuretic; though, strangely, its administration has successfully controlled diabetes insipidus.

Principal Therapeutic Indications. To control some of the manifestations resulting from definite pituitary disease; reducing the neuralgic pains, apathy and lethargy, and also the hemianopsia not uncommonly found in this condition. Useful in certain developmental disorders where anterior pituitary (q. v.) is indicated, including infantilism, adiposity and Fröhlich's syndrome. Because of its hypertensive action it has been used in Addison's disease with fair results. Available as a useful general tonic alone or in conjunction with adrenal extract in conditions where the blood pressure is low, such as tuberculosis, malnutrition, asthenia, typhoid and other severe febrile conditions, etc. In cardiac asthenia it reduces the tachycardia and increases the tension. In anuria it is reported to have caused satisfactory diuresis, though here one would prefer an injection of the posterior lobe principle.

Other Minor Indications. Total pituitary substance has been noted to exert a stimulant effect upon digestion and alimentary peristalsis (due to its musculo-stimulant action) and may be given with other synergistic extracts. It is also of value in "run-down" states, particularly when combined with small doses of thyroid. Little suggests that total pituitary substance may be a useful adjunct in the treatment of cancer in organs of ectodermic origin.

Synergists. Thyroid; ovary or testes; thymus.

Administration and Dosage. One half to one grain after meals and at bedtime. Occasionally, especially in definite pituitary disease, 5 grains or more may be given three times a day.

Remarks. This extract is not used as much as it deserves to be, presumably because it has been recommended in the substitution therapy of pituitary disease (just as thyroid therapy was for many years limited to definite athyroidic cases) or, perhaps, because its therapeutic action has been entirely overshadowed by the rapid rise of posterior pituitary extracts due to their remarkable activity. It is, none the less, a valuable general tonic in many *varying* conditions.

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Administration and Dosage. One to five grains, 3 to 6 times a day, usually given between meals in capsule or tablet form. In asthma 2½ grains four times a day for several weeks.

Remarks. The value of this preparation is being more and more appreciated by those who have to treat mental and physical mal-development in children. Its other possibilities when more fully established will doubtless bring it into more general use.

29. THE PROSTATE GLAND B

Source and Form. The prostate glands of cattle or horses. Available in powder, tablet or liquid form. One part of desiccated gland is equal to 6 parts of prostatic parenchyma.

Physiologic Relations and Action. Prostate extract is not in general use and when given it is for its homostimulant action. It is also said to exert a diuretic action which is probably due to an influence upon the urinary passages, rather than upon the secretion.

Principal Therapeutic Indications. Prostatic hypertrophy with retention, strangury, etc.; chronic prostatorrhea; as an adjuvant in the treatment of specific and non-specific infections of the prostate; following prostatectomy and in the so-called "neurasthenia of prostatic origin."

Other Minor Indications. It has also been recommended in conjunction with testicular substance, since prostatectomy frequently causes functional testicular inactivity.

Synergists. Testicular substance (spermin); lymphatic gland; thyroid.

Administration and Dosage. Three to five grains three times a day, after meals. Occasionally increased to 10 grains at a dose.

Remarks. An opinion is gaining ground that some forms of prostatic hypertrophy are of a compensatory nature since they usually occur when gonad function is on the wane. It is conceivable that the administration of the dried gland might be helpful in such circumstances.

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30. THE SPLEEN

I. Total Extract B

Source and Form. The splenic parenchyma from calves, pigs or sheep. The fresh substance has been highly recommended and liquid preparations of it are occasionally used. It is most often given in powder or tablets, one part representing between 4½ and 5 parts of fresh pulp.

Physiologic Relations and Action. The spleen is said to bring about the activation of the trypsin in the white blood cells, thus favoring phagocytosis. It activates tryptic digestion (Schiff) and Bayle says that the spleen contains a "colloidogen" which favors the maintenance of the mineral elements of the body in their natural colloid state, thus preventing their elimination as wastes. The spleen is also the source of an active peristaltic hormone (q. v.) which, however, seems to be produced elsewhere and only stored up in the spleen.

Principal Therapeutic Indications. Total extract of spleen with or without reinforcement with other synergistic substances is used as an adjunct measure in malnutrition and pulmonary tuberculosis, with anemia and demineralization. (This influences nutrition rather than the actual control of the infection.) Also used in bone and glandular tuberculosis; paludism and severe forms of malarial toxemia and splenomegaly and spleen cirrhosis.

Other Minor Indications. Spleen extract is a hematinic and a solution of it has been recently recommended in pernicious anemia and hypodermic injections for several weeks are said to have secured moderately good results.

Synergists. Thyroid; liver; hemoglobin, etc.

Administration and Dosage. Five to fifteen grains, four times a day after meals. May also be given hypodermically, in which case 1 or 2 mils. of a specially prepared solution are given daily. In tuberculosis Bayle recommends injection of 5 mils. into the glutei each day for 12 days, a rest for 8 days; another series of 12 injections, followed by another rest of 8 days, etc. Fresh spleen may be given in doses of one or two ounces with soup, jam or other disguising substances, twice a day at meals.

Remarks. Spleen extract is not a useless remedy, but is beginning to be used as an adjunct in diseases of nutrition and particularly tuberculosis. [illegible] call it a most useful [illegible] nutrition in certain

31. THE SPLEEN

II. The Peristaltic Hormone [B]

Source and Form. The spleen tissue from cattle or hogs. The animals should preferably be at the height of digestion when killed. A preparation, Hormonal, was on the market in ampules.

Physiologic Relations and Action. The peristaltic hormone discovered by Zuelzer is produced in the stomach and duodenum and stored up in the spleen, hence it is not really a "splenic hormone." It is merely secured from the spleen for convenience. It exerts a remarkable influence upon the intestinal musculature and blood supply, the enteric vessels being temporarily engorged with a large amount of blood, very shortly after the injection of this substance. Blood pressure is thus reduced.

Principal Therapeutic Indications. Acute paretic conditions of the intestines, including postoperative inactivity or paralysis, with obstipation, meteorism, etc. Chronic constipation, etc.

Contraindications. Spastic constipation, shock and vasomotor instability.

Administration and Dosage. Intravenous injection: 20 mils., given very slowly (15 minutes). Preferably in hospital practice. Intramuscular injection: 20 to 40 mils. of a special preparation, with an analgesic, it is understood. Usually given half in each buttock. One treatment usually suffices. For children in proportion.

Remarks. Posterior pituitary preparations have practically superseded this product as their administration is not accompanied by such severe vasomotor changes. Hormonal treatment has caused a number of reported deaths, which were presumed by Zuelzer and others to be due to proteid poisoning. The preparation is now freed from these albuminoids, but still has no obvious advantage over pituitary liquid, etc.

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32. THE TESTES [B]

(Orchic Substance)

Source and Form. The testicles of rams or bulls. Some writers insist that the testes of smaller animals (the cock or the guinea pig) are more suitable for the production of active therapeutic products. Available in powder or tablet form, and also in solution for injection.

One part of dried substance represents from 7 to 9 parts of the fresh gland, depending upon the age of the animal.

Physiologic Relations and Action. The testes contain a chemical element called "spermin" which is intimately concerned in the control of nutrition, oxidation and the cell activities generally. It is the "dynamogenic hormone."

Principal Therapeutic Indications. Infantilism, cryptorchism and congenital malformations of the testes. Functional testicular insufficiencies including sterility, debility, premature senility and impotence. Useful as an adjunct in sexual neuroses and neurasthenia; defective oxidation and reduced cellular activity; and certain disorders of growth and mentality.

Other Minor Indications. Testicular or orchic substance has been used with success in amenorrhea, and in the hot flashes and other allied disturbances of the menopause in women. It causes results quite similar to corpus luteum, sometimes, indeed, where this latter has been given without much success, especially in infantile uterus.

Synergists. Small doses of thyroid; total adrenal gland; prostate gland; lymphatic gland.

Administration and Dosage. Three to ten grains after meals and at bedtime. It is advisable to start with a small dose and gradually to increase the amount. Hypodermic injections have been recommended, but have no special advantage over the products given by mouth, and often cause quite painful proteid reactions.

Remarks. A preparation of the interstitial cells of Leydig (the essential endocrine portion of the testes and presumably equivalent to the corpora lutea of the ovaries) is available, and is particularly rich in spermin. Each part represents about 10 parts by weight of the fresh hormone-bearing cells.

33. THE THYMUS GLAND [B]

I. Total Substance

Source and Form. The thymus glands of calves, [illegible] from fetal animals. Desiccated thymus [illegible] in powder and tablet form.

One part of finished product represents from 6 to 7 parts of fresh gland, depending upon the age and development of the animal from which it came.

Physiologic Relations and Action. The thymus exerts a decided influence upon the metabolism of the mineral salts, especially of calcium. Sajous states that in addition to controlling the growth of bone, the thymus also regulates phosphorus metabolism. Stimulates the hemopoietic organs and the lymphatic glands. Regulates the growth and activities of the essential sexual organs in childhood. The gland ceases to function and is supposed to disappear a short time before puberty.

Principal Therapeutic Indications. Malnutrition, delayed development in children and disorders in which the mineral metabolism is disturbed, especially rachitis. In exophthalmic goiter its use has been frequently followed by a reduction in the tumor and improvement in the exophthalmos as well as the circulatory and nervous manifestations. According to Dor thymus extract excels all other therapeutic preparations in Graves's disease. Chronic joint disturbances including rheumatoid arthritis have been treated with advantage by several writers, but medication must be persistent and systematic; particular attention has been called to the value of this method in controlling severe joint pains.

Other Minor Indications. Certain blood dyscrasias including chlorosis; as an adjunct in tuberculosis with anemia; certain lymphatic disorders.

Contraindications. Thymus extract is especially rich in cell nuclei and it has been suggested that its use should be carefully watched in the uric acid diathesis, gout and other similar conditions.

Synergists. In lymphatic cases calcium salts and lymphatic glands; in Graves's disease anterior pituitary gland; in arthritis small doses of thyroid.

Administration and Dosage. Five or more grains, 4 to 6 times a day, preferably some time after meals. Should be given in gradually increasing amount and continued for weeks or months.

Remarks. Thymus extract is frequently malodorous, but no reports indicate that its administration is detrimental, even following the large and persistent dosage which is indicated above.

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34. THE THYMUS GLAND

II. Nucleinic Acid [B]

(Nuclein)

Source and Form. Nucleinic acid, sodium nucleinate or nuclein is a definite chemical substance found in the nuclei of certain living cells. Originally it was obtained from the thymus, later from egg-yolks, fish roes, milk, brain tissue and yeast. At present the chief source is yeast, though sodium tritico-nucleinate (Nuclein, Abbott) is made from the germ of wheat. It is available in a yellowish-white powder or in solution.

Physiologic Action. It has been claimed to exert a remarkable leucocyte-stimulating effect, increasing resistance to infection by augmenting the antibacterial powers of the blood. Following injections of solutions there is a noticeable hyperleucocytosis, which is rightly presumed to supplement the normal defenses thru the increased phagocytosis thus brought about.

Principal Therapeutic Indications. As a means of increasing the defensive powers of the blood in acute or chronic infections or the infectious diseases. Used with benefit in erysipelas, pneumonia, septicemia, typhoid fever, quinsy, etc. In chronic infections, especially of the asthenic type as tuberculosis, it may be useful. In anemia and general debility, following malaria and infectious arthritis. It improves nutrition in rickety children. Its dynamogenic cell-stimulating capacity and its faculty of "increasing the vigor of the central nervous system" makes it a beneficial adjuvant in the organotherapeutic treatment of hypogonadism and conditions of senile cellular asthenia, especially where a latent infection may be present.

Other Minor Indications. Has been recommended in the treatment of mental disorders as dementia precox, general paresis, etc. It is also said to exert a uric-solvent effect.

Synergists. Nuclein reinforces organotherapy very nicely. It may be given with thyroid, ovarian (or testicular) or adrenal substance. It has been added to combinations for the treatment of prostatic disease, senility, etc., with tangible advan*tage.* It also goes well with Hemoglobin.

Administration and Dosage. By mouth alone or with other indicated remedies in doses of 1/8 to 1/2 grain, three or more times a day. Injections are usually somewhat painful due to the local reaction (hyperleucocytosis also around area of injection), and there may be a temporary febrile reaction immediately following. Nuclein solution contains 6 grains of sodium tritico-nucleinate to the ounce. The dose is 10-60 minims.

Remarks. The reconstructant and stimulant effect of nucleinic acid is indeed valuable, and this remedy deserves to be used more frequently, especially in conjunction with indicated organotherapeutic remedies.

Class C

EXTRACTS USED INFREQUENTLY

35. THE APPENDIX C

Source and Form. The mucous membrane of the appendices of hogs. Secured in desiccated powder or glycerinated extract. One part equals 12 parts of the fresh scrapings.

Physiologic Relations and Action. The appendix is said to produce a substance which stimulates peristalsis and the cecal reflex.

Principal Therapeutic Indications. Constipation; digestive disturbances following appendectomy; intestinal stasis.

Administration and Dosage not yet thoroughly established.

Remarks. Appendicular extract is only used experimentally and casually mentioned in a few French communications.

36. BONE B

Source and Form. The long bones of various animals, from which the organic matter has been removed. Available in powder form. (Some physicians prefer pulverized fresh bone substance in a glycerinated emulsion, with or without suitable adjuvant medicaments.) A preparation of partially digested "Green Bone" from chickens is also on the market.

Physiologic Relations and Action. The mineral salts secured from bones are said to be more easily appropriated by the system, and their administration is claimed to have some influence upon the nutrition and mineral metabolism.

Principal Therapeutic Indications. Conditions in which demineralization is common; tuberculosis, malnutrition, phosphaturia, after parturition, in rachitic children, and in other metabolic dyscrasias.

Administration and Dosage. Ten to forty grains, or even more, with meals.

Remarks. The same salts from other sources should be of equal benefit, i. e., the "remineralization treatment" is of real value and not to be deprecated because of the statements of some that the actual bone salts are "far superior." It is quite possible that a properly prepared bone emulsion, including red bone marrow, might prove of considerable service in suitable cases.

37. THE BRAIN AND CORD

III. Total Substance [B]

Source and Form. The brain matter, spinal cord and nervous tissue of sheep. Defatted powders representing about five times the amount of fresh substance and total emulsions (see Thromboplastin, page 67) are obtainable. An oil solution has also been used.

Physiologic Action. Brain and nerve substance contains lecithin which is a really valuable therapeutic agent (see page 66). Some writers insist that the total extract causes a stimulation of the mental and nervous activities, favors detoxication and is an anticonvulsant of value. This last does not seem to be any too well substantiated, however.

Principal Therapeutic Indications. Mental and nervous disorders, including depression, melancholia, hysteria, epilepsy, neurasthenia, etc. As an adjuvant to remedies as adrenal gland, spermin, etc.

Administration and Dosage. One to three grains of the defatted powder, three or four times a day, between meals. One to three drams of the emulsion, before meals.

38. THE LUNGS C

Source and Form. Lung tissue from very young animals, for preference, lambs. Desiccated in powder form. (Not obtainable in the U. S.)

Pysiologic Action. There is said to be a principle in lung extract which exerts a tonic action upon the whole respiratory tract, especially upon the bronchial mucosa and the pulmonary alveoli.

Principal Therapeutic Indications. Brunet and a few French investigators have recommended lung extract in all chronic diseases of the lungs and pleura, especially those of a purulent character. This included chronic bronchitis, purulent pleurisy, lung abscess, etc. It has also been used with mediocre results in phthisis, bronchial asthma and emphysema.

Administration and Dosage. Dried extracts are given in moderately large doses—10 to 20 grains, 4 to 6 times a day—for months.

Remarks. A ferment called "thrombokinase" which has a decided antihemorrhagic influence, is made from fresh lung tissue. Its value does not seem to be greater than that of blood serum, coagulose, etc. (see page 61), and this last has virtually supplanted it.

39. THE PAROTID GLAND C

Source and Form. The parotid glands of cattle. Available in powder or tablet form . The powder represents 20 per cent. of the fresh substance.

Physiologic Relations and Action. The parotid is evidently also a gland of internal secretion and intimately related to certain of the ductless glands, as evidenced by the frequency with which orchitis, ovaritis, pancreatitis, etc., follow mumps.

Principal Therapeutic Indications. Parotid extract was originally used in the treatment of pelvic troubles in women, especially ovaritis, dysmenorrhea and ovarian neuralgia. It has also been recommended in conditions where the menses are irregular and there is considerable pain at the periods. It might also be of service in the reflex inflammatory sequelae of mumps.

Administration and Dosage. Two to eight grains, three or four times a day, before meals. If this treatment is used, it seems that it should be continued for some time.

Remarks. Parotid extract is practically never used, now that we have a much more effective and physiologic remedy in ovarian extract and corpora lutea (see page 39) which have entirely superseded it. It might be that where luteal extract does not bring about the desired results, particularly where there is ovarian inflammation and much pelvic pain, parotid extract might be given in conjunction with it; 2 grains of parotid to 5 of ovary, repeated every three or four hours before the expected flow, and more frequently during severe menstrual pains.

40. THE PINEAL BODY [C]

(Epiphysis)

Source and Form. The pineal glands from young cattle. The total gland is triturated and dispensed in powder or tablet form.

"It takes approximately 5000 pineal glands of cattle to make one pound of the available extract."

Physiologic Relations and Action. The pineal gland, presumed for a long time to be a rudimentary organ without function, is now known to have a definite physiologic action, especially in childhood and early youth. Disordered pineal function produces quite marked changes in metabolism, which result in a hastening of maturity—physical, mental and sexual; although some writers have intimated that this gland holds these very functions in abeyance until puberty.

Principal Therapeutic Indications. Clinically, pineal gland has been used in the treatment of mentally deficient children without physical stigmata. This includes the not infrequent cases where the mental activity is below par with no obvious organic changes. It has also been recommended in mongolism.

Other Minor Indications. It has been suggested that pineal gland might be of some value in cases of premature mental failure without a distinct organic cause—to "stimulate the aging brain to faster chemistry."

Contraindications. While pineal gland substance is not toxic, it is useless to give it with expectation of results in children over 10 or 12; and in cases of idiocy with anatomical brain or gonad defects.

Administration and Dosage. Half to one grain of the triturate three times a day. It must be given systematically for four to six months.

Remarks. While pineal therapy is still really in the experimental stage, some of the results from experimental feeding are unquestioned, and prompt still further investigation. It would seem, however, that the class of cases for which it is available, and the length and high cost of treatment, militate against its widespread use.

41. THE STOMACH

II. Gastrin [C]

Source and Form. Scrapings from the mucosa of the pyloric antrum from hogs. Made in a [redacted] essentially similar to secretin (see page 34). It has been produced experimentally in powder and glycerinated extract which contains the gastric secretin (gastrin).

Physiologic Relations and Action. Gastrin is said to activate (in a manner quite similar to the duodenal secretin) the peptic and oxyntic glands of the stomach as well as to favor the production of increased quantities of the precursors of gastrin in the cells of the pylorus. Its action is practically identical to that of secretin.

Principal Therapeutic Indications. Gastric insufficiency; apepsia, hypopepsia, dyspepsia, etc.

Contraindications. Hyperpepsia, gastric ulcer, etc.

Administration and Dosage. Not yet well defined—one to five grains of the desiccated scrapings have been given, before meals.

Remarks. The experimental and clinical work with gastrin is by no means as extensive and convincing as that with secretin, and since this latter seems to have a very satisfactory influence upon the indigestions in general, it is used much more frequently.

42. THE TONSILS ᶜ

Source and Form. The tonsils of calves or other young animals. At present the watery extracts alone have been used, and no preparations are yet on the market.

Physiologic Relations and Action. Strangely enough, the tonsil is the most active of all the organic extracts (Ott). It temporarily reduces blood pressure and is stated to exert a glycolytic action. It is said also to favor an increase in both the red and white blood cells.

Principal Therapeutic Indications. Tonsil extract has been used in clinical therapeutics only by a few investigators in Italy in the treatment of diabetes. It is also of possible value in anemia. Tonsil extract is "able to arrest the fatal toxic action of epinephrin."

Administration and Dosage. Hypodermic or intramuscular injections of watery infusions may be made, the dose depending chiefly upon the weight of the animal treated. In clinical work no dose has yet been worked out.

AN ORGANOTHERAPEUTIC INDEX

Considerable advantage can be secured from a therapeutic index—provided it is used right. A good many physicians have little good to say for them, probably because of their very completeness. For example: the best-known therapeutic index lists no fewer than 88 different remedies for tuberculosis, and 48 for typhoid fever! Of course this does not mean that all these numerous preparations are available for the treatment of every case of tuberculosis or typhoid fever; and exactly the same thing applies to the index which follows.

An attempt has been made to index the principal diseases or symptoms which may possibly be amenable to certain of the forms of organotherapy. Obviously this index is purely suggestive.

Note: It has seemed best to omit from this index the therapeutic indications outlined for the products segregated in Class "C," for it will be remembered that these preparations have been used but slightly and as yet have only a comparatively limited utility. The index, therefore, is less complicated, without materially reducing any advantage which it may be to the interested reader.

To save space, the various products are designated by the numbers (**black faced**) connected with them throughout the book and in the Table of Contents.

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PLURIGLANDULAR THERAPY

Some Remarks on the Combining of Endocrine Preparations, with Examples

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An APPENDIX to
"OUTLINES of ORGANOTHERAPY"
by
HENRY R. HARROWER, M. D.
Glendale, California

I

INTRODUCTORY REMARKS

WITH apologies to my readers I wish to preface this brochure with a few explanatory remarks.

After a number of years of study of the internal secretions, much travelling in near a dozen countries to visit workers especially interested in various phases of this fascinating subject, a fairly careful study of the endocrine literature (resulting in three books and a number of articles on internal secretory subjects), and not a little "puttering" in an inadequate laboratory, I have established a "laboratory of applied endocrinology" where I hope to develop a number of ideas which I believe will broaden the practical value of organotherapy.

In considering how to put this laboratory on a satisfactory and self-supporting basis, I decided in favor of building a business with certain organotherapeutic products in order that the profit derived from their sale might maintain the institution and that, as it grows, opportunities might be afforded to develop the suggestions of colleagues who, like myself, have had more or less intangible ideas which have been difficult or impossible of materialization because of limited finances or facilities.

Having made this decision, the most natural way to start seemed to be to prepare a number of pluriglandular formulas which I had been in the habit of prescribing or recommending to my medical friends, and ask these friends to use them if they appeared reasonable. These formulas are given and their therapeutic possibilities are briefly discussed in the following pages, and your favorable consideration of them is solicited.

The next development of the work of this laboratory was the production from time to time of small experimental quantities of various organotherapeutic preparations for colleagues; and already this phase of our work bids fair to accomplish much in the way of broadening organotherapy. Indeed this was the underlying reason for deciding to begin operations. Such "Special Formulas" as may be requested from day to day are worked out with or without my own suggestions. These formulas are made in smaller quantities than manufacturing pharmacists care to consider—only 300 suffices for a minimum batch, and I have occasionally made still less—and are modified from time to time as it seems advisable. Thus useful combinations are developed and it is a source of great encouragement to me to be able also to submit here a number of these "S. F.'s" with suggestive clinical indications and other data.

Arrangements have been made for the distribution of the stock preparations in many centers. This will be extended in due time and whenever a physician wishes my pluriglandular formulas stocked for his convenience in prescribing, this will be taken care of. For the time being the "special formulas" cannot be secured thru the trade, though they will be supplied direct (and usually made specially) on order by physicians or to their prescription pharmacists. They are not sold to wholesalers.

Since the first editions of this brochure have been in print much encouraging correspondence has come to my desk. From one letter I quote a very happy statement: "I have been indebted to you for putting me on to a number of good things in your two books, and now that I am using your own preparations I am getting better results than ever. There is no doubt that your idea about combining glands is right. . . ."

This opportunity is taken to welcome correspondence and the chance to co-operate with the profession in any manner. A little periodical, THE ORGANOTHERAPEUTIC REVIEW, is published by me with the object of keeping interested friends in touch with what is going on in the laboratory, and also with the essentials of the progress in organotherapy. It has been very well spoken of and will be sent from month to month with my compliments to those physicians who request it.

Henry R. Harrower

Glendale, California.
October, 1918.

II

"THE PLURIGLANDULAR THEORY"

A FUNDAMENTAL principle which has broadened organotherapy in a most remarkable way is embodied in the following statement: "Pluriglandular disorder is much more frequent than disorders involving a single gland of internal secretion; hence the reinforcement of an indicated organotherapeutic extract with one or more synergists many times radically alters the results for the better. In fact it may make the difference between success and failure."

It is not difficult to understand that a general influence for harm, toxic, nutritional or emotional, hardly can be expected to limit its effects to a single small part of the organism. A severe toxemia such as we find in pneumonia, typhoid, intestinal stasis or poisoning with alcohol, morphin or other drugs, deranges the function of the body as a whole although in one instance a certain part of it, say the liver, may be more obviously disordered than in another. This applies equally to the endocrine glands and the writer frequently has said with emphasis that "there never was a uniglandular endocrine disorder!" This may seem to be a rather inclusive statement; but it would be difficult to convince me of the reverse, for once one has learned the underlying principle of hormone action and the extreme intimacy of the endocrine glands and their close dependence the one upon the other, it is not easy to conceive of any obvious or hidden disease process affecting only one or two of these remarkable little organs. They may be remotely situated from one another, but they are very closely bound together by hormone ties.

Clinical Endocrine Relationships

The subject is so important and the clinical and therapeutic deductions are so valuable that it may be well to give some more study to this "theory." Take as an example a fairly common ductless glandular disorder—hypothyroidism. It is seen in all gradations and its own ect manifestations are always intertwined with those of other origin. No case of myxedema or cretinism, or even of the less marked but more important minor thyroid insufficiency, shows the manifestations of thyroid dysfunction alone. Metabolism as a whole is reduced—and the thyroid is not the only endocrine gland concerned in the regulation of metabolism. Gonad function is disturbed, and in cretins it practically never develops at all. Then, too, thyroid disorder is so very commonly associated with menstrual function that the gynecologist these days never considers a case of menstrual derangement without considering the thyroid function with that of the ovaries. The sympathetic system, which we have every reason to believe is controlled by the hormones produced in the chromaffin tissue of the adrenal glands, is very decidedly affected in hypothyroidism, and in the well marked cases the blood pressure is low, circulation is very much below par, and the usual sympathetic reactions are dulled or even lost.

Again the so-called "compensatory hypertrophy" of some glands during functional or organic insufficiency of some other intimately associated gland of internal secretion adds to the impression that these organs must be considered together rather than separately. The cycle of the development and atrophy of the mammary glands in relation to the variations of ovarian function is one instance; the not infrequent enlargement of the thyroid (and more rarely the pituitary) during the period of normal ovarian inactivity—during gestation and at the beginning of the menopause; possibly the interstitial glandular hypertrophy of the prostate when the testes are in process of normal atrophy; and other physiological functional dependencies which we do not need to mention, all tend to the conviction that we must no longer consider endocrine disease, functional or organic, as involving the gland or glands alone which most obviously are affected.

Synergistic Organotherapy

This being the case we should be able to make good use of this principle in our work, both diagnostic and organotherapeutic; and the added information that we acquire by viewing various symptoms-complex from the "*pluriglandular* viewpoint" are just as encouraging as the better results that we get from pluriglandular as compared with uniglandular endocrine preparations.

In brief, then, the facts warrant the combination of synergistic gland extracts no matter whether we can see clear clinical evidence of disorder of these synergistic glands. It must be remembered that symptoms do not manifest themselves for quite some time after the beginnings of actual dysfunction in the cells. The ovarian side of goiter, or the thyroid side of dysovarism does not necessarily accompany the first evidence of disturbed secretion in the gland originally affected.

Nor must we limit our new viewpoint to pairs of organs like the thyroid and the gonads just referred to. In hyperthyroidism, for example, not only may we find deranged ovarian function; but I am confident that not a few of the symptoms of sympathetic irritability are not so much due to the excess of thyroid stuff itself as to the undue stimulation by it of the adrenal glands. Really then what we call hyperthyroidism often is hyperadrenia! Or hypercrinism—a generally increased endocrine activity due to a condition which has increased thyroid secretion beyond all reasonable bounds and consequently simultaneously has stimulated the pituitary, adrenals, gonads and other endocrine glands. If this is the case, medication to be successful should take the whole endocrine system into consideration and not the offending thyroid alone. The same applies even more to conditions of hypocrinism which result from pluriglandular insufficiency.

Combinations Superior to Single Extracts

This explains why combinations of various endocrine preparations so often excel single extracts . In previous communications, and in both of my books referred to elsewhere, I have strongly urged the combination of suited products of this kind. The profession is thoroughly converted to moderate polypharmacy, and we combine our A. B. & S., or our I. Q. & S., our mercury and potassium iodide, or many other well-known pharmaceutical products. Rarely is a prescription written for a single remedy, for we are absolutely convinced that synergism is possible in pharmacology just as it is in physiology. Should there, then, be any real basis for criticism of pluriglandular therapy by those who routinely apply the same principles in polypharmacy, especially when we recall that the blood itself contains in solution a host of differing chemical substances, some synergistic and some antagonistic?

As a matter of fact such portions of a pluriglandular mixture given per os as are absorbed into the blood, merely amplify the sum total of hormones circulating in the blood and according to the principle of homostimulation outlined in the body of this book, arouse into increased functional action those organs whose work it is to produce hormones similar to those which have been administered. Thus hypocrinism is reduced and the aggregate of hormone stimuli is increased.

Hormone "Hunger" and "Fullness"

The intricacies of cell chemistry or of the .chemistry of the plasma can only be surmised. Even the physiologists have not been able to ascertain much of this information. Like us they presume and deduce. In my opinion, and it is shared by many others, when we augment the hormone content of the blood by means of pluriglandular therapy, the effect most prominent is the effect most needed, for it is not unreasonable to suppose that in the subtle changes involved in the selection from the blood by certain cell-aggregates of a certain special substance, there is a condition of "hunger" or "satiety" for the necessary hormone, and that when this hypothetical "hunger" for a certain hormone is greater than usual, the capacity to select and utilize the artificially supplemented amounts of that substance (organotherapy) is correspondingly greater. Presumably also the reverse is equally true. So when we give, let us say, a thyroid-ovary-pituitary combination, as we very often do, the thyroid benefit is greatest when the thyroid insufficiency is most and the ovarian reaction is most when the need for the ovarian principles predominates, and so forth.

All this is hypothesis. We can not prove it. We can only note that in one case the effects of a pluriglandular combination lean to those expected from one of the glands presumed to be involved, and in another case *identical* therapy has a different result. This is similar in principle to the statements made elsewhere in regard to the differing reactions in various individuals to whom the same form of organotherapy is given. In one case the results are more striking than in another, undoubtedly because the receptivity of the cells to hormone stimuli differs from the corresponding cells of others, either because the need for these stimuli is less, the hypothetical "hunger" for the hormone is decreased, or the capacity to avail themselves of the offered hormonic assistance is less.

Despite the lack of "positive information," which I have long since given up worrying about (and thereby depriving myself and my patients of benefit), and the undoubted need for more accurate data, we believe from many most encouraging clinical experiences that pluriglandular disorder is the rule and, therefore, that pluriglandular therapy is the logical corollary.

III

EFFECTIVE ORGANOTHERAPEUTIC FORMULAS

WITH the foregoing "theory" in process of metamorphosis in our minds into a "principle," we begin to see in a different light many things which have confronted us in the past. Indeed when one grasps this fundamental proposition, it is surprising how many times our diagnostics are broadened and our opportunities for therapeutic service are enlarged. The endocrine side of chonic disease takes on added interest and we are easily convinced that hypocrinism must complicate many long-standing ailments.

If the nutrition of the body is reduced, so is the nutrition of the glands of internal secretion and their capacity to produce their hormones is also reduced, with the production of a vicious circle. To stimulate these glands at the same time that all the other means of encouraging nutrition are being used, is both a rational and resultful procedure.

If the disorder under consideration is accompanied by toxemia, how can the increased quantities of toxins circulating in the blood not affect the endocrine glands which are particularly susceptible to toxic influences and, in a large degree, are supposed to assist in destroying noxious substances? (The thyroid, parathyroids, liver and, possibly, the adrenals have a well-demonstrated toxin-destroying faculty, and long-continued toxemia can not but "wear out" the organs thus overburdened.) And how many and varied are the diseases in which toxemia is prominent? To attempt to rehabilitate the endocrine glands by means of organotherapy is quite in order, if at the same time a thorough-going effort is made to eliminate the cause. Why give any kind of treatment in hypoadrenia if the cause is overlooked? This is as bad as removing an unruly thyroid and leaving the toxic or infective cause to "knock out" the thyroid remainder which the surgeon is forced to leave.

Several fundamental forms of pluriglandular therapy [illegible] represented by a series of stock formulas made under my supervision. They represent a well-considered attempt to apply the principles of endocrinology to certain fairly large groups of cases. In other instances other formulas are advised and they can be found in Chapter VI. Where necessary, stock formulas can be modified by the addition or subtraction of any ingredients.

A Remedy for Hypocrinism

When an individual has suffered from any long-continued irritation of the endocrine glands, they will begin to fall down in their service to the body. As we have seen toxic, emotional and nutritional influences wear out the endocrine glands as well as the rest of the cells of the body, and since the hormones (Greek, I arouse or set in motion) "drive" the bodily machine they are unusually essential to health. Hence augmented hormone production is particularly helpful in the treatment of all "run-down conditions," whether due to disease or to the normal asthenia of age.

With evidence that we have to deal with hypocrinism—easy fatigue, asthenias of all varieties (myasthenia, neurasthenia, psychasthenia, etc.), poor circulation and low blood pressure and faulty oxidation and elimination—hormonic treatment is in order and I have seen splendid results accrue from a pluriglandular stimulant which I have called **Caps. Adreno-Spermin Comp.*** The formula is as follows:

No. 1

Caps. Adreno-Spermin Co.

Desic. Adrenal Gld. (total) gr. ¼
Thyroid Gld. (U. S. P. IX) gr. 1-12
Spermin Extr. (from Gonads)
Brain and Sp. Cord aa gr. 1
Calc. Glycerophos. q. s. gr. 5

This formula is intended to antagonize "endocrine apathy" and to augment the work of the so-called "adrenal system." It gently encourages the work of those endocrine glands responsible for the dynamogenic functions of the organism and is recommended as a neuro-musculo-circulatory stimulant in asthenic, run-down states. The contained adrenin favors increased adrenal efficiency and is responsible in part for the increase in blood pressure which usually follows its administration for some weeks. Its pressor action is quite unlike that due to the drugs usually administered for this purpose, and the upward curve in the blood pressure chart is the result of enhanced endocrine efficiency.

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*Attention is called to the fact that no trade names are used in connection with any products of my laboratory; that the formulas are open to the profession; that no indications appear on the label and no explanatory literature accompanies the package; and, to my way of thinking, no unwarranted therapeutic claims are made. Every attempt is made to adhere closely to the fundamental principles of ethics both as regards medicine and pharmacy.—H. R. H.

A good deal has been written about the effects of spermin as a stimulant of cell oxidation. Too many claims have been made, to my mind; but unquestionably spermin is a cell stimulant and the more crude testicular substance alone will increase vigor and cellular tone in both sexes. At least it is a useful addition to this formula as many tests of different "cell tonic formulas" have proved. Briefly, spermin, orchic substance or the "liquide testiculaire" originally used by Brown-Sequard on himself in his laboratory in Paris in 1879, exerts a myostimulant, invigorating effect (definitely measurable by means of Mosso's ergograph) as well as its well-known homostimulant effect. Its addition to the Adreno-Spermin formula favors this salutary dynamogenic effect.

It should not be necessary to dwell upon the therapeutic value of lecithin. It is organic phosphorus and more of a cell-nutrient than a cell stimulant. The same is true of calcium glycerophospate (which, by the way, originally was discovered as a product of the gonads by a French investigator and there seems to be no doubt that appreciable amounts of glycerophosphoric acid can be secured from testicular substance as well as from semen). The calcium glycerophospate is used in place of the usual pharmaceutical excipent, sugar of milk, and has the added advantage of being a recognized "nutritive salt."

Finally there is included in this formula a small dose of U. S. P. thyroid gland. It is there for a very definite purpose. Such doses have a distinctly invigorating effect, especially in elderly individuals and in patients who are run-down as the result of fevers, toxemia and chronic disease generally. It is rarely enough to exert a real "thyroid effect," but more than once I have compared the small dose of thyroid in a pluriglandular formula to the Worcestershire Sauce we are in the habit of using with our food—it seems to "bring out the flavor," and it makes a decided difference to the combination.

Altogether I am quite enthusiastic over this combination. Its action is so valuable as an adjuvant in many long-standing disorders and it is usually quite decidedly appreciable by the patient within a few weeks, and, to a certain extent, measurable by the physician through his sphygmometric records and also the elimination of urinary solids, that it does not have to be given "by faith" for very long. Of course the therapeutic response to three or four doses of **Caps. Adreno-Spermin Comp.** a day (preferably before meals) varies with the cellular and endocrine reactivity of the individual and also with what is done for them simultaneously. Many personal experiences and reports from numerous physicians have come in which increase my confidence in this excellent organotherapeutic tonic and reconstructant.

A Developmental Stimulant for Children

It has been shown that defective children always have a very important endocrine phase to their pathology. The subject of "children requiring special attention" is too large to be more than mentioned here in passing; but I think that it is fair to say that the unanimous opinion of the profession includes the ductless glands as prominent in the etiology of these difficult cases. There are many kinds of defective children other than the well-differentiated cretins, and practically all of them have a more or less well-pronounced hypothyroidism. Rarely is this unaccompanied by other endocrine derangements, and the same may be said of the "pure cretin"—his thyroid trouble may be altogether outspoken and frank, but he also has a pluriglandular disorder due to the lack of the stimuli the other glands of internal secretion ordinarily get from the thyroid.

This is really the reason for many failures with thyroid therapy in these cases. The associated endocrine disorders are not treated. Hence not merely in pluriglandular insufficiency in children, but in frank athyroidism or a clear case of Froehlich's disease or hypopituitarism, the obviously indicated gland feeding is profitably supplemented by other extracts. This is particularly true of the thyroid and pituitary glands, and where the one is indicated the other may be added with benefit.

The essential part of the pituitary gland, the anterior lobe or true glandular portion, contains a principle isolated by Brailsford Robertson and named by him "tethelin." This hormone exerts a growth-stimulating effect in addition to its homostimulant effect upon the pituitary itself. It is used in backward children of the "indefinite" type, in pituitary insufficiency, in cretinism and for its purely morphogenic effect in dwarfism or achondroplasia.

Therefore I have used and recommended for years a combination for cases of this type and have seen some indubitable results, such as added intelligence of a type that could be measured by our present standards, the automatic descent of the testes in cryptorchidism, the development of a capacity to enunciate words and combine them into short sentences where previously this long-delayed power was impossible, the removal of chronic constipation lasting from birth and of years standing (when no other drugs were used simultaneously), and a modification of the malnutrition and especially the asthenia so often found in hypoplastic children. The basis of this formula has been modified and modified again and since the establishment of this laboratory the resultant combination has been called **Caps. Antero-Pituitary Comp.** with a formula like this:

No. 2
Caps. Antero-Pituitary Co.
Pituitary (Anterior Lobe) gr. 2
Desic. Thymus Gld. gr. 1
Thyroid Gld. (U. S. P. IX) gr. 1-12
Calcium Phosphorus Co. q. s. ad gr. 5

The addition of thymus is quite empirical. Several communications in the literature record benefit from this form of organotherapy in developmental defects in children and the only reasonable explanation of its possible value is in connection with its capacity to facilitate the metabolism of calcium salts which is supposed to be influenced by this gland and very often is defective in such cases. For the same reason my excipient, called

"Calcium Phosphorus Co.," is used. The formula of this combination of mineral salts will be found elsewhere (see Chapter IV) and the philosophy of its use is merely the principle of "remineralization" so well worked out by the French.

This formula, then, is intended to supplement the dietetic, hygienic and educational development of defective children and must be given for a number of months if any benefit is to be obtained.

My usual recommendations are something like this: "It is clear that we have a serious glandular derangement here. We seem to have had enough results from gland feeding in the past to warrant our using it at least until it has been proved useless. This takes from six months to a year. If you will give the child these gland extracts (explaining, if you will, some of the philosophy of the method and thus increasing the parent's confidence and future co-operation) for three or four months and there is enough accomplished to offer prospect of further benefit we will continue the treatment for six months or more, or until we are sure that it is doing no more good. The results may be seen before three months, they may not be seen till after six months, if no benefit occurs by that time we confess that this particular form of gland feeding is a failure and try again and at the end of a fruitless year we confess total failure, but not before this. It is a long job to re-educate these disordered gland functions." And the patient's parents agree that this is reasonable; and, indeed, it is the only thing to do and fortunately quite often it works.

The dose usually recommended is two capsules a day for 3 out of every 4 weeks for several months.

An Organotherapeutic Galactogogue

The habits of many wild and domestic animals of devouring the placenta suggests that perhaps Nature prompts these beasts to do this for a definite reason. Many years ago crude experiments were made to determine whether the placenta exerted a galactogogue effect and it was concluded that it does. More recently, since better preparations have been obtainable, the subject has been given careful clinical trial and it has been established by tests in many cases that the production of milk is distinctly enhanced following the administration for some days of this somewhat strange remedy. Not only is the amount of milk increased but its quality is changed for the better, especially the fat content.

It has also been shown that placental opotherapy exerts an antagonistic action upon pelvic congestion and uterine subinvolution. It may be possibly this very feature that is Nature's reason for the habit of animals just referred to. Suffice it to say that in therapeutics this method is definitely useful not merely to prevent agalactia but as a prophylactic measure given early enough to augment a waning supply of milk.

On the principle of the synergistic action of organotherapeutic preparations two important additions may be made to desiccated placenta—mammary substance and total pituitary substance . The former exerts its well-known homostimulant effect and at the same time also has an anti-ovarian effect, for the hormones of the mammae and ovaries counteract one another (this is the basis of the use of mammary extract in hyperovarism, conditions of unusual pelvic congestion and menorrhagia), and this is of additional advantage in postpartum conditions. The latter is given for the musculo-stimulant effect attributed to the pituitary principle, and this triad is an efficacious galactagogue combination:

No. 3

Caps. Placento-Mammary Co.

Desic. Placenta gr. 2
Mammary Substance gr. 1½
Pituitary Gld. (total) gr. 1-3
Calcium Phosphorus Co. q. s. ad gr. 5

This preparation has been used successfully when there has been a serious reduction of the amount of milk secreted; but it is more rational as a prophylactic and is recommended as a routine procedure following labor. The initial dose is one or, preferably, two capsules at each of three meals daily for ten days or two weeks, thereafter continuing the administration of one capsule three times a day for several weeks.

Functional Ovarian Disorders

There is a large and increasing literature on the importance of augmenting or regulating the ovarian endocrine function by means of corpus luteum or total ovarian organotherapy. This is one of the "accepted" forms of organotherapy, for unfortunately some physicians still seem to believe that "there is not much in this organotherapy—except perhaps thyroid." Peculiarly enough this very statement has been made to me a number of times and I have had to smile, hence the added phrase about thyroid! Physicians who are not very "strong" on organotherapy always use thyroid in myxedema, they admit that adrenalin is an indispensable remedy and that it comes from an animal gland, and most of them have been convinced of the amazing effects of the posterior pituitary solution. The same is beginning to be true about corpus luteum and before long these same skeptics will have accepted the whole principle rather than the few most obvious parts or it.

At all events functional pelvic disorders and the reflex disturbances resulting therefrom for fifteen years or more have been successfully treated with suitable organotherapy, usually corpus luteum or ovary alone, and no method or drug can begin to take the place of such preparations, especially in a functional hypo-ovarism due to disturbed regulation of the ovarian hormone production, and to mitigate the numerous sympathetic-circulatory manifestations of the menopause, normal or artificial, pathological or physiological.

I can not begin to enumerate the emphatic opinions in favor of this measure; but wish to show that the use of corpus luteum or ovary alone is not likely to be so completely beneficial because the hormone-complex as a whole has not been taken into consideration. It has been shown by many investigators that the thyroid function is extraordinarily intimate with that of the ovaries. We know that goiter is often connected in some way with menstrual disorders, that pituitary insufficiency means gonad insufficiency, and so forth. Clinically we have found out that the thyroid and pituitary principles are synergists of the ovarian hormones and many times thyroid or pituitary feeding alone has benefited symptoms seemingly due to ovarian dysfunction. The combination of these gland products with ovarian substance is indeed useful, and it "hits the mark" more often than the single extract for the very same reason that pluriglandular therapy in general excels the use of single extracts.

For years it has been the custom in France to use thyroid gland whenever ovarian feeding was indicated. The combination is superior to either of the single remedies. Dalche, of Paris, has explained this quite fully and clinical experience by hundreds of physicians has demonstrated that this idea is well founded. So I offer for your consideration this formula:

No. 4

Caps. Thyro-Ovarian Co.

Desic. Corpora Lutea }
Ovarian Substance } gr. 2½
Thyroid Gld. (U. S. P. IX) gr.1-12
Pituitary Gld. (total) gr. ⅛
Calcium Phosphorus Co. q. s. ad gr. 5

The indications are virtually those of corpus luteum or total ovary substance as stated in numerous contributions to the literature of the past 8 or 10 years. The only contraindication is hyperthyroidism, for which I offer another formula on page 23 (**Caps. Pancreas Comp.**). This thyro-ovarian combination contains both the desiccated corpus luteum of pregnant animals and total ovarian extract and is indicated in dysovarism with menstrual or climacteric disorders, nervous or circulatory. It is warmly recommended in the treatment (not necessarily as the whole treatment) of functional pelvic derangements such as amenorrhea, postponed menstruation, dysmenorrhea and the numerous symptoms due to circulatory imbalance of pelvic origin. Particularly does this combination excel corpus luteum alone in the control of the hormonic chaos which occasionally accompanies the menopause. Here the more or less sudden loss of a hormone stimulus to which the body has been accustomed for thirty years or more, causes very severe symptoms and among these are certainly some due to hypothyroidism resulting from the reduced stimuli to this gland. Small doses of thyroid are sometimes remarkably beneficial at the menopause for the very good reason just mentioned. The same is true of the pituitary extract largely because it antagonizes the general muscular atonicity (including that of the uterus and other pelvic *structures*) so usual at this period.

Many times this form of organotherapy is used to mitigate the lowered resistance and general discomfort due to defective ovarian hormone production. For instance how many times have we met the girl or woman who has a period of stress prior to practically every menstrual experience? Whose skin breaks out with acne or eczema? Who may have tonsil or sinus trouble which "lights up" now and then, usually just prior to the menses? Who comes down with grip or something else, usually beginning during the premenstrual week? Who complains of nervousness, asthenia and a sense of impending trouble until the menstrual flow, perhaps long delayed, materializes and is well established? There are thousands of such individuals who in reality are suffering from hypocrinism—involving the ovaries and thyroid, and perhaps others of the endocrine glands—and who will receive lasting benefit from pluriglandular therapy.

A word or two about dosage is in order. This form of treatment is intended to influence the ovarian hormone function. This is a cyclic function, reaching its height just prior to menstruation and dying down to little or nothing thereafter until the monthly period of increased activity is again due. Hence ovarian medication is unnecessary during and for some time after the flow. Here is the routine which I suggest, and emphasis should be laid on the necessity for continuing this measure for several months, for the idea is to affect ovarian endocrine function and this lasts only a short time each month:

Instruct the patient to count 10 days from the onset of the last menses, and during this time to take no capsules. Then one capsule is taken prior to each morning and evening meal during the second 10 days; and a third daily dose is added during the third 10 days, or until the flow starts, when the capsules are stopped.

Following this routine for several months very considerable benefit has accrued in many neuroses of ovarian origin, in amenorrhea, dysmenorrhea and functional pathology due to circulatory imbalance of ovarian origin.

Increasing Fundamental Cell Nutrition

That the greater abdominal glands, the liver and the spleen, exert some subtle endocrine function is accepted by many even though it is still a disputed point. Most physiologists are agreed that these glands exert a fundamental influence upon nutrition, and the liver by its comprehensive powers of detoxication and bile production is indeed an essential part of the endocrine system. The spleen, too, is claimed to have a part in the regulation of nutrition, especially the assimilation of iron and the maintenance of the intra-cellular digestive processes including those phagocytic digestive powers which make the white blood cells so extremely useful to the organism.

In Europe both hepatic and splenic opotherapy has been in use for 20 or 25 years. A comprehensive study of the literature of these two forms of organotherapy will be found in my book "Practical Hormone Therapy" (Chapters IX and XI). The opinions long held over there are beginning to take hold in this country and the homostimulant action of extracts of these organs is now used by some to enhance those functions which are largely responsible for nutrition. So I offer the following trophogenic combination:

No. 5

Caps. Hepato-Splenic Co.

Desic. Liver Parenchyma
Desic. Spleen Substance aa gr. 2
Powd. Bile Salts gr. ½
Adreno-Spermin Co. (No. 1) gr. 1

The effect of the hepato-splenic combination is reinforced by a small dose of the bile salts and minute doses of the cellulo-tonic combination already referred to on page 36. It has been used with reported good results in conditions of poor nutrition such as tuberculosis, postfebrile malnutrition and cachexia.

I have found considerable encouragement from its use as an adjunct measure in intestinal stasis. Here one expects to find toxemia, anemia and malnutrition accompanied by hepato-biliary stasis and general digestive lassitude. I would not for one minute recommend this formula for the treatment of so broad a disorder as Lane's disease, save only as a means of augmenting other measures. When measures have been taken to support and strengthen the relaxed abdominal walls, when the accumulations in the dilated bowels are removed and impaction, especially at the hepatic and splenic flexures of the colon, has been disposed of and the patient is put upon a dietetic and hygienic regimen calculated to remove at least some of the causes of the toxemia and asthenia, then, and then only, it is perfectly reasonable and in order to attempt by means of organotherapy to restore the sluggish cellular functions especially of the liver, spleen and adrenals.

It may be hinted by some that the treatment suggested above is likely to be helpful without the organotherapy, and I admit it fully; but I also assert that under such circumstances the removal of anatomical causes has no special beneficial effect upon the long-established results, and we are merely taking away a source of disturbance and letting the body get along as best it can. Undoubtedly the inherent recuperative powers of the organism are better able to respond when the burdens are lightened or removed entirely; but the subtle cellular encouragement to the liver and other abdominal glands certainly favors their more speedy and more thorough restoration. And why should not we give such an individual the benefit of as much physiological assistance as possible? Why merely remove the cause (if possible) and leave Nature to make the best of it? For this reason I urge a consideration of pluriglandular therapy of the kind represented by the formula just mentioned, and know from personal clinical experience that it is by no means an inert remedy.

Sympathetic Sedation in Hyperthyroidism

When the thyroid gland becomes irritable and unruly there immediately results a condition of sympathetic excitability which is largely responsible for the nervous manifestations, the circulatory instability and the heart hurry. Elsewhere I have remarked that with hyperthyroidism we must needs expect hyperadrenia and before long this changes to hypoadrenia when as a result of overstimulation these little glands are worn out.

A hundred and one efforts to cure exophthalmic goiter and hyperthyroidism have left us convinced that it is difficult or impossible to cure the disease itself. We must find its cause and remove it, then, perhaps, we will get better and more lasting results from our therapy. Incidentally just a word about the surgery of hyperthyroidism. I have seen many cases after operation, in whom the real cause was never found and after surgery the old trouble returned with added dangers and difficulties. Just as this is being written I am telephoned about a case 7 weeks after operation at one of our most important hospitals by a surgeon of repute. The pulse is 140, acetonemia is marked and both patient and physician are at their wits' end.

The successful treatment of thyroidism consists largely in removing the cause rather than its effects! It is quite in order to operate in some cases but even here the surgeon should know as much about etiology as possible. Hyperthyroidism is not solely a thyroid disorder.

A part of the symptomatic treatment of the results of hyperthyroidism properly involves the other endocrine glands and suitable organotherapy certainly helps to control matters. Desiccated pancreas is used by several and it acts thru its antagonistic effect on the adrenals. It is a sympathetic sedative as well as a stimulant to digestion. The pituitary principle also is valuable for its cardio-tonic effect—it slows the pulse and strengthens it (and many times is best used by hypodermic injection daily or as indicated).

Andre Crotti, whose recent book "The Thyroid and the Thymus" (Lea & Febiger, Philadelphia) is indeed a monument to the author's skill and insight into this subject, recommends a pluriglandular formula which includes equal parts of pituitary, adrenal and corpus luteum. I like to add a generous dose of desiccated pancreas and recommend the following combination:

No. 6
Caps. Pancreas Co.
Desic. Adrenal Gld.
Pituitary Gld. (total)aa gr. ½
Ovarian Substance gr. 1
Desic. Pancreas Gld. q. s. ad gr. 5

This formula may be used in the treatment of hyperthyroidism in conjunction with other measures which the exigencies of the case seem to indicate. It has a favorable influence upon the nervousness and the pulse rate and seems to cause a steadying effect which is very desirable in these cases. It should always be combined with a thorough-going effort to find and eliminate sources of toxemia (teeth, tonsils, sinuses, alimentary canal and gall bladder, pelvis and elsewhere) and with medication calculated to increase the mineral (alkaline) reserve of the organism. (See Chapter IV.)

The dose of **Caps. Pancreas Comp.** is from 3 to 6 capsules a day, given preferably an hour or more before meals.

Reinforcing Thyroid Extract

For along time I have given certain mineral salts in conjunction with thyroid extract on what I consider to be very good grounds. Thyroid extract is practically always given in the hope of stimulating metabolism, for hypothyroidism of any degree, from the minor functional insufficiency to the serious conditions of myxedema or cretinism, always means mineral starvation, for the increased systemic wastes rob the body of its alkaline elements and cause acidosis or hypoalkalinity. This is one of the reasons why hypothyroidism is so commonly accompanied by a high urinary acidity and low total solids. It is also why the adipose condition is quite commonly connected with hypothyroidism.

No. 7
Caps. Thyroid Co. Gr. ⅛
Thyroid Gld. (U. S. P. IX) gr. ⅛
Calcium Phosphorus q. s. ad gr. 5

I prepare three formulas under the name **Caps. Thyroid Comp.**, each dose containing, respectively, ⅛, ¼ or ½ a grain of standardized U. S. P. IX desiccated thyroid gland with a really useful excipient consisting of a balanced alkaline-saline combination (Calcium Phosphorus Comp.) quite similar to the salts found in the blood. I contend that this "filler" is just as valuable as the thyroid extract in every case where the latter is indicated; and believe that the results from the use of **Caps. Thyroid Comp.** will be more satisfactory than from thyroid alone, for the obvious reasons just mentioned and more fully considered in the next chapter.

IV

RELATION OF THE MINERAL SALTS TO NUTRITION

AT first thought it may seem strange that this matter is given consideration here; but the reader will shortly see that the subject has much to do with the internal secretions for the very good reason that the internal secretory glands have much to do with metabolism.

Let us recall a few facts. Oxidation, and particularly the gaseous exchanges carried out by the blood, is dependent upon a certain content of alkaline salts in the plasma. In fact it has been aptly remarked that "life is alkalinity, death is acidity." The life-giving processes of the body practically all involve the presence of alkalies; while, on the other hand, the wastes of the organism as well as the toxins produced by disease and abnormal conditions in the alimentary canal, are all acid in reaction or, at least, are alkali robbers. The subject of hypoakalinity and acidosis is large enough to fill several books of this size; and we can only mention some salient points very briefly.

The acid wastes of metabolism or disease rob the blood and tissues of a part of their alkalies and thus account for the "acidemia" of chronic and infectious diseases. This defensive act on the part of the body—the neutralization of as many acid wastes as possible—brings about an alkali hunger or "demineralization," as the French call it. It is the commonest of conditions in all phases of medical and surgical practice. Yet attention is not given to this subject in the degree that its extreme importance warrants.* Our patients are allowed to continue to follow methods of cooking and eating which deprive them of the very salts that Nature intended should serve to combat the tendency to alkali-depletion common to the "life processes" (in reality properly called "death processes"). Then when conditions reach an extreme we prescribe alkalines, sometimes even by intravenous injection in a belated effort to antagonize this alkali demineralization which accompanies practically every disease process!

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*In 1908-9 I did quite a bit of work and wrote a number of articles on the condition known as "acidemia" or systemic hypoalkalinity. I reported a large number of experiments and clinical studies which tended to show that the estimation of the urinary acidity was an easy and satisfactory means of estimating the alkaline balance. I also showed that when indican was present in the urine, more than 70 per cent of the long series studied also showed an abnormally high urinary acidity. A good deal has been written about this since; and I have had many communications from physicans whose eyes had been opened to the importance of routinely considering the urinary acid index. To facilitate this study in 1908 I devised an acidimeter [illegible]ish to estimate the acidity of the urine . (Sold by

Restoring the Mineral Balance

The method of treatment originated years ago and in routine use in France under the name "remineralization" is indeed a rational procedure and while open to criticism as not being so good as accomplishing the same thing by dietetic means (this, of course, is attempted as a part of the associated hygienic treatment of all conditions of this character, but is not sufficiently rapid in its effects to supercede the use of alkaline mixtures), it is a life-saving measure.

The relationship of the ductless glands to mineral metabolism is very important. Several of these organs have been given very essential responsibilities in controlling the "fixation" of the mineral nutriment of the organism. Osteomalacia is said to be of gonad origin. The parathyroïds are intimately connected with calcium metabolism and experimental tetany following parathyroidectomy can be controlled by feeding or injecting calcium salts. Rickets is now considered to be just as much an endocrine disease as any metabolic-nutritional dyscrasia. The thymus is considered as exerting some mysterious control over the utilization by the growing organism of both phosphorus and calcium. Undoubtedly a large factor in tuberculosis is connected with ductless

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the Taylor Instrument Companies under the "Tycos" mark, the Abbott Laboratories, and other instrument houses both here and abroad). This takes the place of the more cumbersome and expensive burette, though it gives no more accurate service. Its chief advantages being compactness, portability and lower cost. I cordially recommend acidimetry in the study of all chronic disease. When the average normal acidtly of 30 to 40 degrees is found to be 80, 100 or even 150 or more degrees, surely this information is of more value than the routine report "Reaction—acid."

glandular function (from both angles, cause and effect) and comparatively recently it has been shown that functional hypoadrenia, commonly present in tuberculosis (asthenia, malnutrition and hypotension are just as pathognomonic of tuberculosis as of hypoadrenia), is in some way responsible for the elimination of calcium in the abnormal quantities noted in tuberculosis, and that the so-called "lime-starved state" is a logical accompaniment of hypocrinism.

So remineralization and organotherapy go hand in hand, the one supplementing the advantages of the other in a very tangible manner.

Supplementing Endocrine Function

Again it so happens that an important part of the chemical service rendered to the organism by the endocrine glands is the maintenance of the metabolic processes and the destruction of toxins by oxidation. We all know how badly disorganized is the cell chemistry in thyroid insufficiency. Hence it should be correct to deduce from this that every case of hypothyroidism is likely to be suffering from mineral starvation; and clinically this is absolutely a fact. It is just as true in the minor thyroid insufficiencies that are overlooked every day, as in myxedema or cretinism, and the only difference is one of degree.

Let me repeat this for emphasis: Subthyroidism means retarded cell metabolism. This, in turn, means a concentration of an abnormal amount of wastes which, because of their affinity for alkalies, deplete the body's reserve of these minerals. Or as I have remarked elsewhere: "Hypothyroidism means suboxidation; suboxidation means toxemia; toxemia means hypoalkalinity and hypoalkalinity means mineral starvation or demineralization."

Surely the correction of this ultimate condition is just as rational as the augmentation of the endocrine deficiency which caused it. In other words, we can advantageously supplement thyroid therapy (and other organotherapeutic measures) with an attempt to replace the mobile mineral reserve of the organism—remineralization. *This* should be the rule in all chronic disease, especially those which involve metabolism and nutrition —not merely such notable types of systemic hypoalkalinity as diabetes mellitus, "rheumatism," etc. Incidentally it is surprising how often a very small dose of thyroid supplements this mineral therapy.

Several methods are available. It is very easy to recommend a package of the "Arm & Hammer" brand and to suggest 60 to 100 grains a day in plenty of water remote from meals; and this helps, sometimes amazingly. In France they use bone-dust, oyster-shell powder and other "organotherapeutic" mineral preparations. I do not believe that these salts are any the more easily assimilated than the ordinary chemicals of commerce. For instance, calcium phosphate is actually made commercially from bone ash and, therefore, according to some, should be called an "organic" mineral salt.

Several formulas have been recommended in the remineralization procedure. For a long time I used a proprietary called "Metabolets" made in New York. I have used Trunececk's so-called "artificial serum," with slight modification. This is said to be "the normal blood salts in proper proportion"; and the formula is: Sod. Chlor. 0.8 gm., Sod. Sulphate 0.08, Magnes. Phos. 0.3, Sod. Carb. 0.3, Sod. Phos. 0.25 and Calc. Phos. 0.25. This is an average dose and is given three times a day especially in arterial degenerations.

Calcium Phosphorus Compound

I personally use and recommend a combination which I have called "Calcium Phosphorus Comp." I believe that its addition to thyroid extract is particularly rational and my "Caps. Thyroid Comp." is a carefully standardized (U. S. P. IX) preparation diluted with this remineralizing combination of salts. The formula is as follows: Magnes. Phos. 1, Calc. Phos. 4, Calc. Glycerophos. 4, Potas. Bicarb. 16, Soda Bicarb. 25 and Sod. Chlor. to make 100 parts. The potash salt is indeed an advantageous addition despite its present abnormal expense; and I prefer to replace the more strenuous sodium carbonate with the bicarbonate which is not so irritating to the stomach, and, too, it is not deliquescent like the carbonate and is easier handled in a dry form.

Calc. Phosphorus Co. is the standard diluent in my laboratory, taking the place of the usual milk sugar because it has a distinct therapeutic value, especially in conditions in which it is advisable to prescribe organotherapy. Indeed, many of my friends are now demanding it alone to supplement their treatment of numerous disorders and before long I may be offering a tablet as an adjuvant to other preparations from this laboratory.

Since writing the above, the requests for a product like the remineralizing combination just referred to have made it seem advisable to put out a tablet of this useful alkaline-saline formula. While the sole function of my laboratory is to develop organotherapy, it is not out of place to co-operate with those who are interested in my work and preparations; and despite the fact that Calcium Phosphorus Comp. is by no means a glandular product it is indeed useful when given in conjunction with pluriglandular medication. It is not easily obtainable on the market and I have many times put up 9-grain capsules of my excipient as a favor to those who wanted to increase the dose over the amount which may be in the organotherapeutic capsules.

So I have had prepared some friable tablets of one gram (15 grains) and call them "**Tabs. Calc. Phosphorus Comp.**" (Harrower)—when prescribing write the words as above to avoid conflict with "calcium phosphate"—and recommend two to six of these tablets as a suitable daily dose, one to three of them being crushed and taken with a full glass, or more, of water, at least three hours after or one hour before meals.

V

A TEST FOR THYROID SECRETORY FUNCTION

A KNOWLEDGE of the endocrine activity of the various glands would be a very convenient addition to our diagnostic information if there only were some way of measuring it. We know well enough, or should know, when an individual has a prominent increase or decrease in the functional activity of some of the endocrine glands, but the less prominent forms are not so easily estimated. Too often they are altogether overlooked.

During the several years that I have devoted myself largely to the study and diagnosis of disorders of the ductless glands and conditions in which the endocrine side is presumed to be prominent, I have many times wished that I could have a chart of the various endocrine capacities just as we can get a report on the elimination of the different urinary solids or a record of the several facts about the circulation—the pulse, systolic and diastolic pressures, pulse pressure, etc. Like all others I have found those whose response to thyroid therapy was both unexpected and undesirable, and out of these failures I have devised a method of testing or measuring comparatively the thyroid secretory capacity.

The Differentiation of Goiter

This information is of much service, especially as we recall that there are two distinct varieties (variously subclassified) of goiter—(1) the simple enlargement of the gland which is an effort on the part of the body to supply an increased demand for the particular product which may be deficient or used to excess, and (2) the pathological hypertrophy due to some extra-glandular cause which brings with it varied symptoms of hypercrinism. The former, or simple, goiters represent an attempt on the part of the organism to render it the best service possible and usually are benefited by a course of treatment which includes the administration of thyroid stuff thus supplying the need, in part at least, and rendering the friendly glandular enlargement unnecessary. In such cases thyroid extract, iodine and other similar remedies speedily reduce the goiter. (See page 35.)

In the other class of cases, however, conditions are vastly different. Some stimulus, usually toxemia from a focal infection and occasionally deranged function on the part of some other of the allied endocrine glands particularly the adrenals, is driving the thyroid faster than usual. It is more sensitive and hence more unruly. The hypertrophy differs materially in origin and, naturally, in its treatment. What would be beneficial in simple goiter, would be detrimental in hyperthyroidism.

The differentiation of the advanced stages of these conditions is not difficult but, alas, it is of less value, for then conditions have gone well past the early, functional stages. If we can find a way of discovering the thyroid sensitiveness or susceptibility to hormone and other influences, we have differentiated between latent hypo- and hyper-thyroidism, and accomplished something of real value.

This did not appear to be a difficult task in view of the occasional reactions we have noticed in connection with thyroid therapy; so I have devised a method whereby definite, step-ladder doses of thyroid gland with a suitable excipient, are given in a uniform and routine manner, while a careful and regular study is made of the pulse and other reactive symptoms. At first I was quite surprised at the information thus obtained. The charts were most interesting and many times I found out that in a given case conditions were quite considerably different from what I had supposed.

The following statement is printed on a convenient slip together with a chart upon which the patients record the findings, and is handed to them with a small box containing the materials for the test:

A Method of Thyroid Function Testing

Instructions

Each package of "Thyroid Testing Capsules" contains 12 capsules of three graduated strengths and sizes. A pulse chart accompanies each, with explicit instructions as to how to fill out the record.

After the consultation, at which the first pulse-counting is done and recorded, the patient counts the pulse again at 6 and 9 o'clock; and the following morning commences to take the four small capsules at 8, 10, 12 and 2 o'clock with a swallow of water, recording the pulse five times a day—at 9, 12, 3, 6 and 9 o'clock. On the second day the four medium-sized capsules are taken at similar hours and the pulse is again recorded under as nearly identical conditions as possible, and at the same hours.

During the third day the four large capsules are taken at the same hours as previously and the pulse is again recorded as before. The fourth day, or the "first day after" finishing the ingestion of the capsules the pulse is recorded as before and again during the forenoon of the fifth day when the chart is completed (and plotted, if convenient), the physician is consulted and the data thus secured carefully studied.

It is important to watch for symptoms such as irritability (temperamental or nervous), twitchings (of the eyelids, lips, fingers, etc.), breathlessness and other nervous manifestations. If it should happen that on the second or third days these symptoms are present and prominent, the remaining capsules should not be taken; but the chart is completed, while on its reverse side a brief statement is made of the symptoms, giving the time of onset and other related facts.

Reading the Pulse Charts

Some day I am going to publish a number of these plotted pulse curves with the other accompanying clinical and later therapeutic findings. It is most interesting. In the meantime to facilitate the use of this thyroid function test by my colleagues I will give the gist of my conclusions.

Ordinarily the experimental thyroid medication makes a slight difference to the pulse rate in the normal individual, rarely, however, does it reach above 90 and then only under the immediate influence of the ingested thyroid, i. e., it falls back again the day after. In hypothyroidism the pulse is usually lower than usual and the reaction following the thyroid medication is little or nothing, in other words the apathy is visible on the chart. In the various stages of thyroidism, the pulse findings are characteristic, the greater the susceptibility the wider the range. The evidence of an irregular-appearing chart with the pulse 100, 110 or more is very definite, and as previously noted when the patient sees this early in the test, the balance of the capsules is omitted. Again in thyroidism the pulse does not immediately return to its norm, and in fact it may be accelerated during several days after, in which case it is well when it seems advisable to omit a part of the capsules to extend the record of the pulse figures over the sixth and seventh days.

No. *Date*

PULSE CHART

Name *Address*

	DAY BEFORE			FIRST DAY					SECOND DAY					THIRD DAY					DAY AFTER TEST					2D DAY AFTER			
	3	6	9	9	12	3	6	9	9	12	3	6	9	9	12	3	6	9	9	12	3	6	9	9	12	3	6
160																											
150																											
140																											
130																											
120																											
110																											
100																											
90																											
80																											
70																											
60																											
50																											

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The test is greatly facilitated by the printed instructions and chart as well as the use of a uniform and standard dosage of thyroid. In other words, it is an advantage to pay a few cents—thirty-three in fact—for a ready-to-use test, than to make it up or prescribe it as needed. I find a marked advantage in the finished marketable test over that prepared extemporaneously in the same laboratory and used before the charts were printed or the accurately standardized series of capsules was made.

With the information thus secured it is possible to render a much more satisfactory service to the patient, and, too, it gives one a feeling of comfort in the treatment of goiter which is well worth while.

VI

SPECIAL PLURIGLANDULAR COMBINATIONS

AS explained in the introductory remarks, the object of this laboratory of applied endocrinology is to broaden organotherapy; and it is my opinion that this will be done more by discovering the mysteries of the relations of the endocrine glands and the advantages of combining their extracts, than in any other way.

The facilities of this laboratory have been placed at the disposition of the profession and a surprisingly large number have availed themselves of this opportunity. Scores of various combinations of gland products have been made, and modified, and made again. A number of the most interesting of these special formulas are given here. I am taking the liberty of drawing attention to their therapeutic possibilities and believe that the good results attained by a few will be repeated by many who heretofore were not aware that we produced anything save the stock pluriglandular formulas discussed previously (Chapter III).

Let it be understood that any combination will be made on request. These special formulas can be changed to suit your own ideas. Those enumerated in the following pages appear to have a reasonable basis of usefulness and are known to be serviceable.

Simple Goiter

In the previous chapter I have called attention to a test for the differentiation of simple hypertrophic goiter and thyroidism with or without marked glandular enlargement, and emphasis was laid upon the diversity of the treatment. Where thyroid enlargement is the result of an attempt of the system to meet certain unusual demands for the thyroid stimuli, the gland becomes enlarged in order to render the larger service required of it. There are, of course, many other conditions to be considered in the study of goiter; but we may safely say that many a simple goiter will respond favorably to thyroid feeding and to the administration of iodine. I think I have an excellent combination which serves the double purpose of offering the organism a suitable amount of thyroid and a convenient form of iodine, and believe that the added hematinic virtues of the iodide of iron as well as the leucocyte- and resistance-stimulating effect of nuclein make a far better preparation than plain thyroid alone.

Special No. 18

Caps. Iodised Thyroid Co.

Thyroid Gld. (U. S. P. IX) gr. ¼
Ferrous Iodide gr. ¼
Ac. Nucleinic (nuclein) gr. ¼
Calcium Phosphorus Co. q. s. ad gr. 6

Some may care to have still less thyroid and no nucleinic acid, in which case another similar formula may be prescribed:

Special No. 19

Caps. Iodised Thyroid Co. without Nuclein

Thyroid Gld. (U. S. P. IX)
Ferrous Iodide aa gr. ¼
Calcium Phosphorus Co. q. s. ad gr. 6

One or the other of these combinations is recommended as a very useful part of the treatment of simple goiter, and from 2 to 5 doses may be given daily, depending upon circumstances. In anemic girls with obvious thyroid enlargement and no evidence of thyroidism (after the Thyroid Function Test has been made) the enlargement sometimes "melts away" in a few weeks. However, always in such a cases a careful search should be made for hidden causes of the thyroid hypertrophy and quite often it may be that dysovarism is an underlying cause which, of course, may be better treated with another similar remedy, my **Caps. Thyro-Ovarian Comp.**, for instance. (See page 18.)

Quite often I have recommended inunction of the thyroid area with Iodex ointment every evening with benefit. I have also used an ointment of the yellow iodide of mercury. Elimination, remineralization and good hygiene are also a part of the treatment of all cases of goiter.

Hepato-Biliary Insufficiency

A very simple but distinctly useful combination is that of desiccated hepatic substance with the active principles of the bile salts, thus:

Special No. 22

Caps. Bile Salts Co.

Powd. Bile Salts
Desic. Hepatic Substance aa gr. 3

The clinical indications for the administration of either of these organotherapeutic remedies are well known. The combination is superior to the single ingredients. In functional liver troubles, intestinal stasis, biliary insufficiency, gall stones and sluggish bile flow, as well as in more serious disorders of nutrition and particularly tuberculosis, a formula of this character can be recommended with benefit. As a means of reinforcing the cellulo-tonic effect of **Caps. Adreno-Spermin Comp.**, referred to in Chapter III (p. 11), two or three daily doses of **Caps. Bile Salts Comp.** help to clear up the sallow skin and loosen up the liver secretions in a very nice way.

The proper dose of **Caps. Bile Salts Comp.** is "enough"! Usually three capsules a day suffice, taken preferably remote from meals with a little water. Again two capsules at night may be quite sufficient, while early in the treatment of some old chronic cases where real "dynamite" is needed to awaken the liver and the patient has been accustomed to cathartics of all kinds for years, five or even six doses a day for a while may be advisable. Give enough to cause two or three stools a day, and after a week have the patient gradually reduce the dosage until only two capsules are being taken at night. I recommend that this small dose be continued for several months.

Intestinal Indigestion

Another very similar formula is:

Special No. 23

Caps. Pancreatin-Bile Co.

Pancreatin (U. S. P. IX)
Powd. Bile Salts
Desic. Hepatic Substance aa gr. 2

a part of the hepato-biliary extracts being replaced with an active pancreas preparation. The indications are virtually the same as for the previous formula, though perhaps this addition of pancreatin makes this combination more suited for the control of conditions in which intestinal indigestion, alimentary putrefaction, fetid stools (often light-colored and sticky) and mucous colitis are prominent symptoms. The dosage of **Caps. Pancreatin-Bile Comp.** is one or two capsules two or three hours after food; and of course the treatment which favors a clean bowel should be prescribed simultaneously.

A Remedy in Paralysis Agitans

The parathyroid glands have been shown to serve the body by their faculty of destroying toxins which have a predilection for the nervous system. There has been a good deal of controversy about the pathology of the parathyroids in paralysis agitans, tetany, and other conditions of similar character. Good results have been secured by parthyroid therapy in these disorders and while the prognosis in advanced cases is not especially good, there have been occasional results that would not be believed when they were reported; and some writers have come in for quite a little criticism because they reported splendid control of all the symptoms which characterize Parkinson's disease.

Here is a formula which you may care to use:

Special No. 24
Caps. Parathyroid Co.
Desic. Parathyroid Gld. gr. 1-20
Spermin Extr. (from Gonads) gr. 1
Powd. Bile Salts gr. 1½
Calcium Phosphorus q. s. ad gr. 5

This is superior to parathyroid substance alone for three reasons: (1) there is a well-established functional relationship between the parathyroids and the liver, (2) practically every case of paralysis agitans would be the better of the functional liver stimulation which the supplementary bile salts favor, and (3) the cellulo-tonic effect of spermin is always useful in senility and this disease is essentially of waning celluar activity.

I have had occasion to put up this formula with 1-200 grain of atropine sulphate to each capsule, and this has made it of considerably greater value. The amount of the alkaline-saline combination used in this formula may be augmented by giving increased amounts.*

The Control of Functional Hypertension

The conception that certain forms of functional hypertension are either of endocrine origin or amenable to

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[illegible] at end of Chapter IV.

measures calculated to modify endocrine activity, has been given study by a number of individuals and an opinion is gaining ground that when such organic disorders as renal disease, cardiac hypertrophy or arteriosclerosis can be ruled out, the hypertension may be due to irritation of those organs responsible for the maintenance of the sympathetic manifestations, including the blood pressure. The French admit an adrenal form of hypertension; and I am personally convinced that toxemia, bacterial, intestinal or drug (caffeine, morphine or alcohol, for instance), is capable of stimulating the adrenal system and thus producing the high pressure. This may be merely a suspicion; but it is seemingly confirmed by the sometimes remarkable depressor effects of desiccated pancreas given internally. This exerts an anti-adrenal effect and it is conceivable that in the cases in which this remedy is so strikingly useful, the adrenals have been overworking and the sedative influence of the pancreas suffices to reduce this.

Some time ago I initiated a series of clinical experiments with several organotherapeutic formulas for the control of functional hypertension, and submit here four formulas, somewhat similar to one another, which have been developed as a result of these experiments.

Special No. 27
Caps. Thyro-Pancreas Gld. Co.
Desic. Pancreas Gld. (total) gr. 3
Thyroid Gld. (U. S. P. IX) gr. 1-12
Calcium Phosphorus Co. q. s. ad gr. 5

Special No. 28
Caps. Thyro-Pancreatin Co.
Pancreatin (U. S. P. IX) gr. 4
Thyroid Gld. (U. S. P. IX) gr. 1-12
Calcium Phosphorus Co. q. s. ad gr. 5

Special No. 29
Caps. Thyro-Pancreas Co. with Spermin
Desic. Pancreas Gld. (total) gr. 2
Thyroid Gld. (U. S. P. IX) gr. 1-12
Spermin Extr. (from Gonads) gr. 2
Calcium Phosphorus Co. q. s. ad gr. 5

Special No. 30
Caps. Thyro-Pancreas Co. with Ovary
Desic. Pancreas Gld. (total) gr. 2
Thyroid Gld. (U. S. P. IX) gr. 1-12
Ovarian Substance gr. 2
Calcium Phosphorus Co. q. s. ad gr. 5

All of these formulas have given fairly good results; the last has proved particularly useful in the functional hypertension, sometimes acompanied by adiposity, in adiposity, in women at or just beyond the menopause.

While the principal objective in the use of any of these formulas has been the control of the high blood pressure, it must not be forgotten that this is usually an incidental result. **Caps. Thyro-Pancreas Gland Comp.** and the similar but different **Caps. Thyro-Pancreatin Comp.** are both useful in hypothyroidism in elderly persons especially where digestion in the intestine is not good.

The by-effects of the addition of the spermin-bearing extract and total ovary in Nos. 29 and 30, respectively, are well worth while, and as a gonad stimulant they both have their place. In fact many good reports of the benefit from these two formulas lead me to hope that we are "on to" a really useful measure in the adjunct control of disordered chemistry with high blood pressure.

A Post-febrile Reconstructant

Following acute infectious diseases, especially in children and young people whose powers of resistance are none too good, certain forms of "nutritive organotherapy," if we can coin this term, are particularly advantageous. Lecithin, "the most easily assimilated form of phosphorus," is indicated in such cases and the definitely established effect of nuclein (nucleinic acid) in increasing leucocytosis and the powers of resistance adds to its value. Hemoglobin is also especially valuable for its hematopoietic and reconstructive capacity far exceeds that of many of the other less easily assimilated and more commonly used forms of iron. To such a splendid combination we can add a small dose of spermin (from the interstitial cells of Leydig) for its dynamic or musculo tonic effect and we have an organotherapeutic reconstructant that "delivers the goods"!

Special No. 35

Caps. Nuclein-Hemoglobin Comp.

Ac. Nucleinic gr. ¼
Lecithin gr. 1
Spermin (Leydig cells) gr. 1
Hemoglobin q. s. ad gr. 5

A preparation like this combines several purely physiological stimulative effects all of which are especially needed following any severe illness whether acute or chronic, in young or old. This will be found far superior, because more rational, than the old-fashioned tonics like I. Q. and S. A hundred capsules, given in doses of three or four capsules per day, will augment the reestablishment of those essential functions which have suffered from the fever and toxemia from which the patient is convalescing.

Hemoglobin in Anemia

The market is filled with many forms of iron, from the old-fashioned Blaud's mixture to various "organic" irons which are recommended in the treatment of anemia. Certainly iron is a valuable remedy for anemia, provided that the iron is both absorbable and assimilable, features which are not at all true in connection with many of the customary iron salts in current use. Personally I prefer the intramuscular injection of iron cacodylate as a first-class remedy for anemia and malnutrition, for the combination with arsenic is a splendid one. The next best form of iron, and the very best form for internal use is the so-called "ferrum sanguinis" or hemoglobin. This is indeed organic iron and it is rapidly and constantly absorbed without constipation or indigestion. It has all the advantages of other salts of iron—ferric and ferrous—and there must be some other effect than merely that of the iron molecule, for hemoglobin is considerably better than most other hematinic tonics. Yet is not so very much used in this country.

At the request of a prominent internist up-state I prepared for him the following formula:

Special No. 37
Caps. Hemoglobin Co.
Repurified Hemoglobin gr. 3
Medullary Substance gr. 1
Thyroid Gld. (U. S. P. IX) gr. 1-16
Calcium Phosphorus Co. q. s. ad gr. 6

This was used with considerable success, especially in young persons where there seemed to be evidence of a minor form of hypothyroidism complicating the anemia and malnutrition. In the anemic, pasty youngster whose resistance is low, such a remedy is excellent.

Later some physicians asked to have a similar preparation without any thyroid extract, and it was suggested that the addition of a medium dose of spleen extract ought to be good, for there is quite a little in the literature on the hematinic and reconstructive value of this substance. So another hemoglobin combinationwas made which is called **Caps. Spleno-Hemoglobin Comp.**:

Special No. 36
Caps. Spleno-Hemoglobin Co.
Repurified Hemoglobin gr. 3
Desic. Spleen Substance gr. 2
Calcium Phosphorus Co. q. s. ad gr. 6

I have had some fine reports from those who have used these formulas, and I am not surprised for theoretically they should be "winners."

The dose is 3 or 4 capsules a day, preferably taken just before meals. In severe anemia a larger quantity of **Caps. Spleno-Hemoglobin Comp.** may be given for some weeks; and, on the other hand, in the hypothyroid anemia or where **Caps. Hemoglobin Comp.** is advised in children or adults with an obvious thyroid insufficiency, the amount of thyroid may be increased by administering **Caps. Thyroid Comp.** (⅛, ¼ or ½ gr. of thyroid) simultaneously, and the accompanying alkaline mineral salts are by no means a disadvantage in this particular class of cases.

Mammary Extract in Menorrhagia

One of the most peculiar features of organotherapy is the antagonism of the internal secretions of the mammae and ovaries. It is well established that the administration of mammary substance antagonizes ovarian function and thereby reduces pelvic congestion, uterine enlargement and abnormal menstrual bleeding. Some writers, especially of the Petrograd school, believe that mammary therapy reduces uterine fibroids and even cures them; but while I have seen many good results in the control of menorrhagia I have not seen any remarkable effects upon new growths of the uterus.

[redacted] formulas with mammary substance as their prepared in this laboratory, three of here. The first contains these in-

Special No. 38
Caps. Mamma-Ovary Co.
Mammary Substance gr. 2½
Ovarian Substance gr. 1
Thyroid Gld. (U. S. P. IX) gr. ⅛
Calcium Phosphorus q. s. ad gr. 5

Despite the fact that these first ingredients are theoretical antagonists, the combination is useful in moderate menorrhagia with dysmenorrhea and simultaneous evidence of dysovarism, such as a difficult menstrual onset, or an abnormally short interval between the menses. Sometimes this formula may be alternated with **Caps. Thyro-Ovarian Comp.** in ovaro-uterine disorders which lean to menorrhagia or where the clinical results from this latter stock formula leave something to be desired.

Caps. Mamma-Ergotin Comp., prepared for a prominent Oakland gynecologist, contains a medium dose of Bonjean's ergotin, thus:

Special No. 39
Caps. Mamma-Ergotin Comp.
Mammary Substance gr. 3
Ergotin (Bonjean) gr. ¾
Calcium Phosphorus q. s. ad gr. 5

This is not merely a symptomatic regulator of menorrhagia, but it is simultaneously modifying the underlying conditions which are responsible for the excessive hemorrhage.

Still another formula of this type, in which the uterotonic effect of the above combination is reinforced by the addition of total pituitary gland:

Special No. 40
Caps. Mamma-Pituitary Co.
Mammary Substance gr. 2½
Ergotin (Bonjean) gr. ½
Pituitary Gld. (total) gr. ¼
Calcium Phosphorus q. s. ad gr. 5

There is an optimum manner in which to administer preparations of mammary substance. I usually recommend a similar procedure to that outlined for the dosage of **Thyro-Ovarian Comp.** (see page 19), but instead of omitting during the menses I push the dosage then. For ten days after all flow has ceased the capsules are not taken, then doses of 2 or 3 capsules a day are taken for 10 days, more or less depending upon the length of the intermenstrual period. Three or four days before the flow is expected and during the flow, the dosage is increased as may seem advisable, 6 or more capsules being quite in order.

Extreme menorrhagia is best treated with the **Caps. Mamma-Pituitary Comp.**, and even a hypodermic of pituitary solution or cotarnine hydrochloride may be needed before the excessive flow is under control.

Senility, Asthenia and Prostatic Disease

The homostimulant effect of extracts of the gonads has been proved time and again since Brown-Sequard's original experiments. It is possible to increase waning gonad function just as we can augment the endocrine function of other glands. A distinction must be made between the internal and external secretory function of these glands. Organotherapy may increase the production of the seminal fluid, or it may not; it certainly exerts a very distinct effect upon those general cellular functions which are the result of the internal secretion of the testes. This means that while impotence may not always be so remarkably benefited as the charlatans insisted so vociferously when they "caught on" to what Brown-Sequard was doing (and thereby gave scientific organotherapy a bad name for thirty years or more), the dynamogenic effect or the influence on general cell-tone is undoubted.

The essential endocrine part of the testes, the interstitial cells of Leydig, which correspond in a sense to the corpora lutea of the ovaries, contain the active principle called "spermin," discovered and exploited by Prof. von Poehl of Petrograd. This stimulates oxidation and muscular power, and is the essential therapeutic element in orchic substance, didymin and desiccated testicular substance.

An active product of these cells is prepared under the name **Caps. Leydig Cell Comp.**, and a proportion of this substance representing over 20 grains of the fresh glandular tissue is found in each dose or the equivalent of four tablets of the testicular product quite generally known to the profession. The small dose of thyroid is added on the principle that in asthenic individuals as well as in elderly men there is a general hypocrinism present and, besides, a prominent New York physician suggests that a small daily dose of thyroid in elderly persons "helps to keep the arteries soft"! Finally calcium glycerophosphate is superior to milk sugar as an excipient (even though it costs several times as much) for it is a constructive mineral which is easily absorbed and which it is claimed supplies much needed and thoroughly assimilable phosphorus to the nervous tissues.

I have been much pleased with the reports on Caps. Leydig Cell Comp.:

Special No. 41
Caps. Leydig Cell Co.
Spermin Extr. (Leydig cells) gr. 2*
Thyroid Gld. (U. S. P. IX) gr. 1-16
Calcium Phosphorus q. s. ad gr. 5

Peculiarly enough this formula was originally prepared for a prominent urologist for the treatment of certain forms of prostatic hypertrophy, especially that type of enlargement not accompanied by an infection, that is not infrequently found in men whose gonad activity is on the wane, and which is not the result of a new growth. It is conceived that this prostatic enlargement might be of a compensatory nature, the prostate attempting to supplement the lessened service rendered by the testes. Suffice it to say that in addition to general cellular stimulation such as one might expect from the homostimulant action of such a formula, I have definite information that it has also caused decided benefit to the most common symptom of prostatic enlargement—difficult and frequent micturition.

Another similar formula contains an extract of lymphatic glands for reasons which I am not quite sure of. It is said, but not proved, that lymphatic substanec is of benefit in conditions of gonad insufficiency such as we have just been considering.

Special No. 42
Caps. Leydig Cell Lymph Co.
Spermin Extr. (Leydig cells)*
Desic. Lymphatic Glds. aa gr. 2
Thyroid Gld. (U. S. P. IX) gr. 1-12
Calcium Phosphorus Co. q. s. ad gr. 6

Another remedy for the difficulties accompanied by prostatic disease and the cellular insufficiencies of sexual

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**This is the equivalent of nearly 20 grains of the Leydig elements of fresh sheep's testes.

neurasthenia contains the tonic principles just referred to together with desiccated prostate gland substance.

There has been some controversy over the merits of prostatic organotherapy, but this is not unusual. Clinically it has helped, it may again!

The addition of nuclein is certainly of value in conditions of lowered resistance.

Special No. 48
Caps. Prostate Gland Co.
Desic. Prostate Gld.
Spermin Extr. (from Gonads)
Desic. Lymphatic Glds. aa gr. 1½
Acid Nucleinic gr. ⅛
Calcium Phosphorus Co. q. s. ad gr. 6

The dosage of these three remedies is usually one or two capsules three times a day just before meals. Since the effects are expected to be of an endocrine nature, and unlike the rapid and fleeting stimulation of strychnia and other similar drugs, the extracts must be taken for some weeks or months in order to educate or re-establish lost or deficient hormone-producing functions. Where organotherapy is advisable for moderately long periods, I usually advise the omission of the remedy entirely during every third or fourth week.

Hemophilia and Lymphatic Children

In the occasional child or, for that matter, the adult who exhibits a lymphatic tendency, bleeds easily and is also poorly nourished and anemic, the following hemostatic and reconstructive combination has been recommended:

Special No. 43
Caps. Lymphatic Gland Co.
Desic. Lymphatic Glds. gr. 2
Spleen Substance gr. 1½
Thyroid Gld. (U. S. P. IX) gr. 1-16
Calcium Lactate q. s. ad gr. 6

It will be seen that this formula "sounds well" theoretically, and while in difficult cases of this type it is neither easy nor right to promise results, for practically never can we be assured of all that is wrong with the patient, at least we can administer a preparation of this character with reasonable prospects of favorable results.

The suggested dose is three or more capsules per day, just before meals; and where the anemia is marked it may be well to add a similar dose of **Caps. Hemoglobin Comp.**, mentioned previously.

Definite Pituitary Disease

Fortunately well-defined disease of the pituitary gland is not common. Hypopituitarism or Froehlich's syndrome is a disease with a discouraging outlook. The only hopeful treatment at present recommended (by Cushing, Bartels and other authorities) is gland feeding. There are several possible pituitary preparations, for the gland has at least three distinct histological portions. The total gland is often used; so is the anterior lobe or the essential glandular portion of the hypophysis. The former contains a principle which influences carbohydrate metabolism, while the latter contains a quite different substance which stimulates growth and the development of gonad function. For several reasons which I need not enumerate I suggest the following **Caps. Pituitary Comp.** which is a balanced combination of an extract of the total gland and also of the anterior lobe with Calcium Phosphorus Comp.:

Special No. 47
Caps. Pituitary Co.
Pituitary Gld. (total)
Pituitary Gld. (anterior lobe) aa gr. 1½
Calcium Phosphorus q. s. ad gr. 5

Please note that the above figures, and for that matter all the preceding figures in this book, refer to grains of finished desiccated gland substance and not to fresh substance. This distinction is very necessary in figuring both dosage and costs. Usually the formulas as outlined repreesnt one average dose, to be repeated two or more times a day. In the case of pituitary feeding it must be continued for long periods, the above formula or **Caps. Antero-Pituitary Comp.** containing also thyroid and thymus extracts (see page 14) being given two or three times a day before meals.

VII

PRICES

THE stock formulas from this laboratory are distributed thru the regular trade channels, and physicians may prescribe them thru their usual pharmacists who, in turn, obtain them either direct or from their jobber. The following prices are for retail and the patient should not pay more. A discount of 20% is given to physicians by this laboratory or the druggist who may supply him.

Different arrangements are necessary with experimental or special formulas. Ofttimes these are not even in stock at the laboratory and have to be made to desired to prescribe any of these it will be necessary to so inform your pharmacist and have him order direct. These formulas are never sold thru the wholesale trade, and are only stocked by certain druggists who do so by arrangement with, and for the convenience of, certain interested prescribers.

Special formulas other than those listed here will be made with pleasure. Any quantity may be ordered, though it is preferred to make a minimum of 300 capsules of a given formula. Any formula will be changed on a similar basis, and the charges will be in harmony with those mentioned below and with the costs of the desired ingredients. Modified stock formulas are, of course, special formulas.

Your patronage, and thus your co-operation in maintaining and developing this laboratory of applied endocrinology, will be much appreciated; and suggestions or criticisms will be gladly welcomed.

STOCK FORMULAS

No	Name.	Indication	gr	50	100
1	Caps. Adreno-Spermin Co.	Dynamogenic	v	$1.50	$2.50
2	Caps. Antero-Pituitary Co.	Development	v		3.75
3	Caps. Placento-Mammary Co.	Galactogenic	v	2.00	3.50
4	Caps. Thyro-Ovarian Co.	Ovaro-Uterine	v	2.00	3.50
5	Caps. Hepato-Splenic Co.	Trophogenic	v		3.00
6	Caps. Pancreas Co.	Hyperthyroidism	x	1.50	2.50
7	Caps. Thyroid Co. (gr. ⅛)	Hypothyroidism	x	1.00	1.75
8	Caps. Thyroid Co. (gr. ¼)	Hypothyroidism	x	1.00	1.75
9	Caps. Thyroid Co. (gr. ½)	Hypothyroidism	x	1.00	1.75
10	Thyroid Testing Capsules	Function Test		3 t.	1.25
11	*Tabs.* Calc. Phosphorus Co.	Hypoalkalinity	xv	1.00	1.50

Too much emphasis can not be laid on the statement made previously to the effect that Special Formulas, including those listed below, are not on regular sale thru the trade. Do not expect your druggist to have them or to know of them. You can order them direct at the net prices below or you can have them sent to a designated pharmacy for convenience in prescribing, but the druggist can not get them from his wholesaler.

SPECIAL FORMULAS

No	Name	Indication	gr	100
18	Caps. Iodized Thyroid Co.	Simple Goiter	vi	$2.75
19	ditto without Nuclein	Simple Goiter	vi	2.25
22	Caps. Bile Salts Co.	Biliary Insufficiency	vi	2.00
23	Caps. Pancreatin-Bile Co.	Intestinal Indigestion	vi	2.50
24	Caps. Parathyroid Co.	Paralysis Agitans	v	3.00
27	Caps. Thyro-Pancreas Gld. Co.	Hypertension	v	2.25
28	Caps. Thyro-Pancreatin Co.	Hypertension	v	2.50
29	Caps. Thyro-Pancreas Co. with Spermin	Hypertension (men)	v	3.00
30	Caps. Thyro-Pancreas Co. with Ovary	Hypertension (wom)	v	3.00
35	Caps. Nuclein-Hemoglobin Co.	Postfebrile Convalesc.	v	3.50
36	Caps. Spleno-Hemoglobin Co.	Anemia	vi	3.00
37	Caps. Hemoglobin Co.	Hypothyroid Anemia	vi	3.00
38	Caps. Mamma-Ovary Co.	Dysovarism	v	3.00
39	Caps. Mamma-Ergotin Co.	Menorrhagia	vi	3.00
40	Caps. Mamma-Pituitary Co.	Menorrhagia	vi	3.50
41	Caps. Leydig-cell Co.	Senility, etc.	v	3.00
42	Caps. Leydig-cell Lymph Co.	Senility, etc.	vi	3.50
43	Caps. Lymphatic Gld. Co.	Hemophilia	vi	3.00
47	Caps. Pituitary Co.	Hypopituitarism	v	3.00
48	Caps. Prostate Gld. Co.	Prostatic Disease, etc.	vi	3.50

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